Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

MAY, 1939

COOLERS

FOR CEMENT AND LIME KILNS

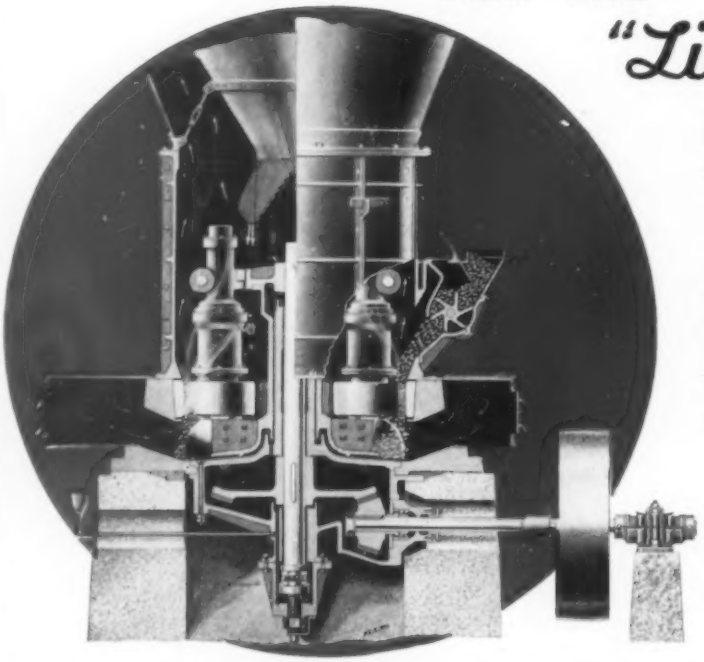
UNAX
Planetary or Grate types, integral with kiln.
ZONAX
Air quenching Pre-Cooler, integral with kiln.
FLS INCLINED GRATE
Cooler, separate from kiln, for primary and secondary cooling.
FOLAX
Rotary Pressure cooler.
FLS MULTI-TUBE ROTARY
Indirect water-cooled type, for secondary cooling.

F. L. SMIDTH & CO.

WILLIAMS FINE GRINDING EQUIPMENT

FOR THE——

"Lime Industry"



BEATER MILL WITH SPINNER SEPARATOR AND CORE THROWOUT *for* HYDRATED LIME

Again in the lime field as in all others Williams equipment leads the way. The Beater Mill has many advantages for grinding hydrated lime—they include:

- A positive worm feed which never clogs.
- As the "Daddy" of the Hammer Principle Williams has brought a new and improved arrangement of hammers to the Beater Mill.
- An improved design of taking air into the mill so as to give more grinding output.
- An improved throwout for elimination of unburned cores.
- Spinner Air Separator which overcomes clogging of vanes common to old type Vane Separators—built in four standard sizes.

ROLLER MILL WITH SPINNER SEPARATOR *for* BURNED LIME • • • finenesses up to 325 mesh

For handling limestone, burned lime and similar materials, Williams Roller Mills have many improvements and can be furnished with either Vane or Spinner type Air separators. The Super Separator (vane type) is instantly changeable from a fineness of 70% passing 100 mesh to 99.99% passing 325 mesh.

Features Include:

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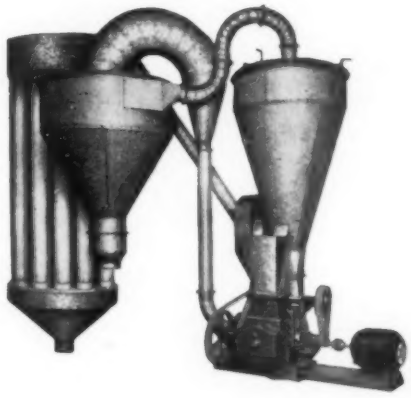
- Steel instead of cast Iron at important points
- More capacity on extremely fine grinding
- Heavier and more durable construction
- Unusually low upkeep expense
- Nine Standard sizes



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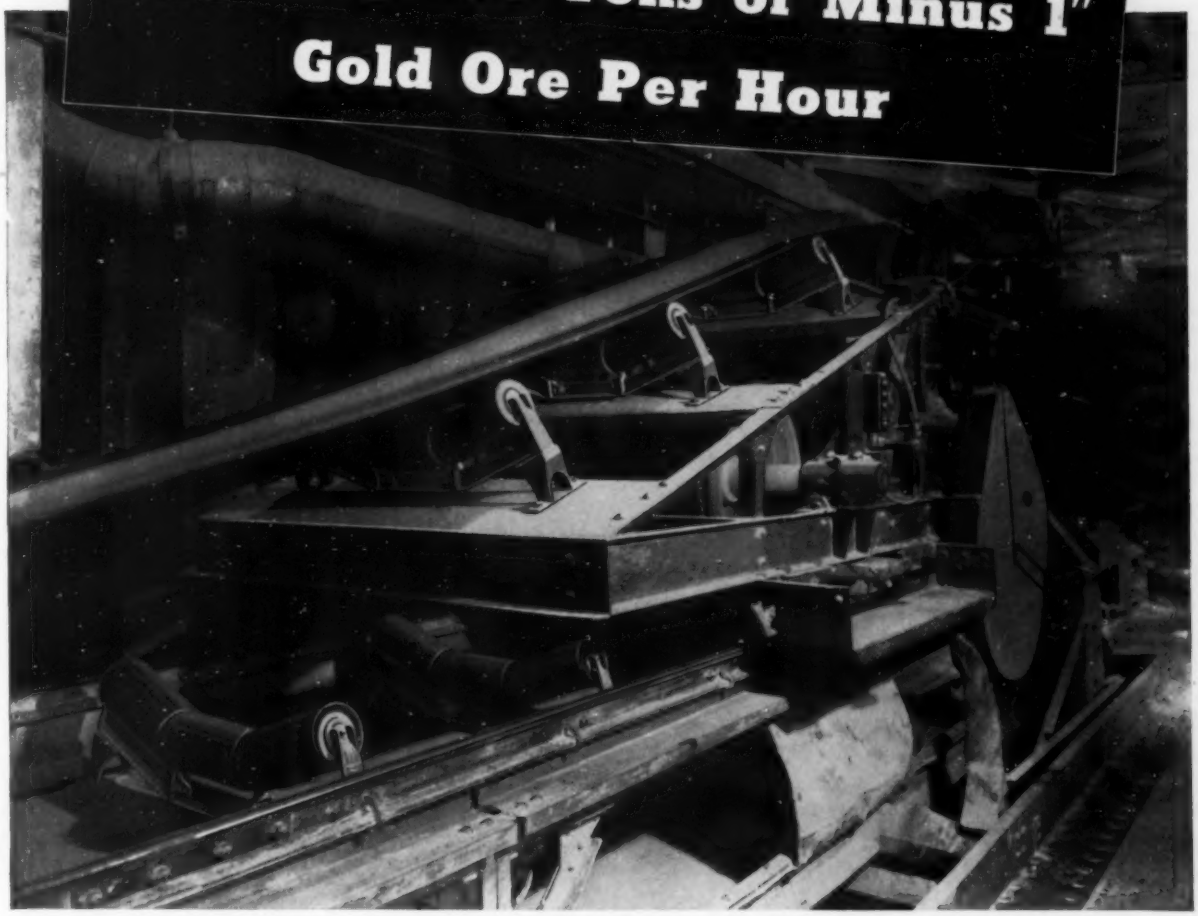
Williams

PATENT CRUSHERS GRINDERS SHREDDERS

Handling 400 Tons of Minus 1" Gold Ore Per Hour



Working 16 Hours Per Day Since Feb. 1931

● This 30" wide anti-friction belt conveyor has been handling minus 1" gold ore for the last 8 years, at the rate of about 6000 tons a day—half of this volume being a circulating load. The tripper is of all-steel construction, completely automatic, electrically controlled.

We welcome the opportunity to serve you whenever you have need for conveying or power transmitting machinery, and shall be pleased to have one of our engineers help you select the right equipment for your individual requirements. Address the nearest office.

LINK-BELT COMPANY

Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our other offices located in principal cities. 7630

1939
NEW YORK WORLD'S FAIR EXHIBITOR METALS BLDG.

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MAY -9 1939

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CONCRETE PRODUCTS — Est. 1918

Recognized the World Over as the Leader in Its Field

VOL. 42 CHICAGO, MAY, 1939 No. 5

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Bears the Twin Hall-Marks of Known Value

Impartial measurement of reader interest in terms of paid circulation

Authentic facts relating to editorial scope and readership analysis

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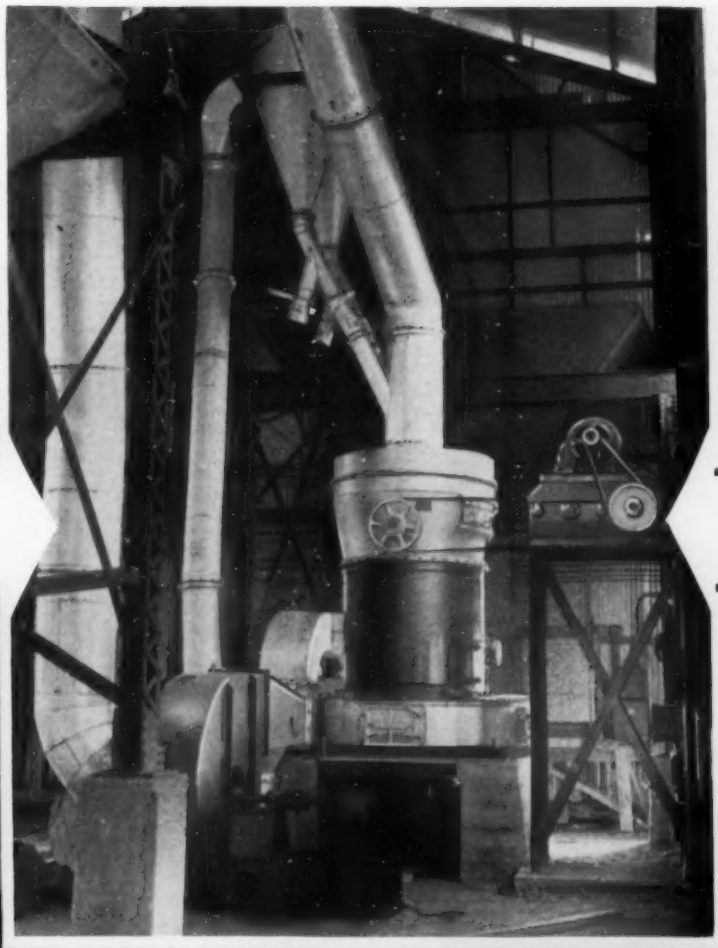
DRYING SYSTEM



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New METHOD OF *Finish Drying* AND *Grinding* SPECIAL CLAY

Latest Type . . .
RAYMOND ROLLER MILL

THIS Raymond installation shows how a difficult clay handling job is simplified by the use of a whizzer-equipped Roller Kiln Mill with a drying system. This modern unit combines the drying, pulverizing and classifying of the product into one continuous, dustless operation.

The crude material comes to the mill pre-dried to a maximum of 15% moisture. It is ground to a fineness of 95% through 200-mesh and the moisture content reduced to less than 6% at a capacity of 8000 to 9000 pounds per hour of dried clay. Hot gases are supplied to the system by an oil-burning furnace. A variable speed transmission on the whizzer drive gives close control over the fineness.

This economical method is also applied to many other operations, such as calcining gypsum, drying and grinding limestone, diatomaceous earth, bauxite and similar non-metallic minerals.

Write for detailed information on drying-grinding methods.

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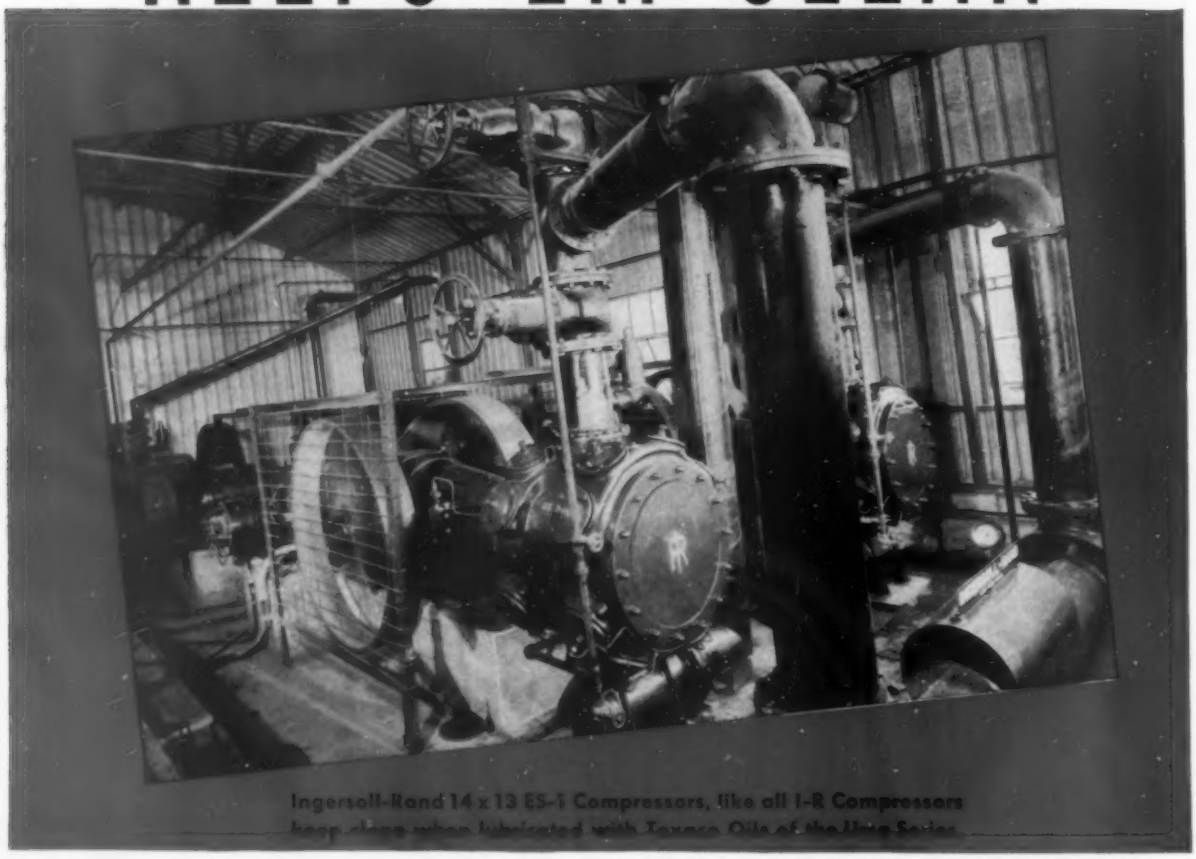

Ingersoll-Rand 14 x 13 ES-1 Compressors, like all I-R Compressors keep clean when lubricated with Texaco Oils of the Ursa Series

QUARRY AND MINING MEN throughout the world know that the only dependable compressor is a CLEAN compressor.

You can be assured of compressors having clean valves, clean rings, clean air passages when you lubricate them with clean, clear oils of the Texaco Ursa Series.

In Vermont, the world's largest monumental granite quarry has used no other lubricants but Texaco, for years.

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From North Carolina, a granite quarry reports astonishing reductions in maintenance costs since going over to Texaco.

For long years of service from *your* equipment, lubricate it with Texaco. Experienced lubrication engineers are available to help you. Phone nearest of 2229 Texaco warehouses or write:

The Texas Company, 135 East 42nd Street, New York City.

Texaco Dealers invite you to tune in The Texaco Star Theatre —a full hour of all-star entertainment—Every Wednesday Night—Columbia Network—9:00 E.D.T., 8:00 E.S.T., 8:00 C.D.T., 7:00 C.S.T., 6:00 M.S.T., 5:00 P.S.T.

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LABORATORY TESTED

Which means that Macwhyte Wire Ropes, when given a "final OK" by the mill, are ready for dependable, economical service.

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... on all kinds of jobs, on all kinds of equipment, under all kinds of conditions. All year long, Macwhyte Engineers on the *job*, are constantly proving, improving, perfecting the *right* wire rope for *your* specific job.

NO. 389

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Whyte Strand - PRE *formed* WIRE ROPE

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The TIMKEN Rock Bit is the only bit manufactured with this shoulder construction and therefore the only bit that can give you the foregoing advantages. There is an Authorized Timken Rock Bit Distributor at the other end of your telephone.

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ROCK BITS

This is it!

TRAYLOR TYPE H BLAKE JAW CRUSHER

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it makes good every time!

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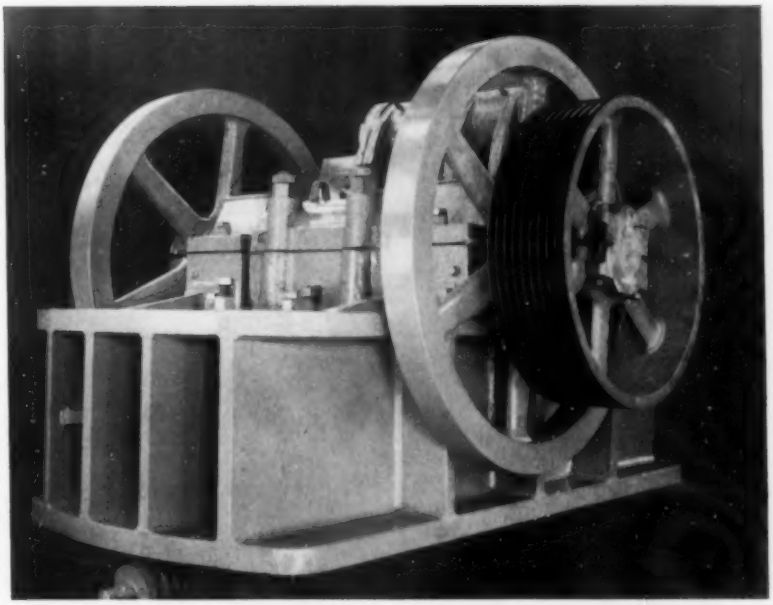

The Blake jaw crusher, now over 90 years old, was the first successful crushing machine, and is still the best in principle. The Traylor Type H Jaw Crusher preserves all desirable features of the Blake design, but otherwise it is strictly modern. The design in general is greatly simplified, the frame full welded and husky, yet lighter than earlier cast frame machines, the swing jaw and pitman are cast steel, the toggles are steel with flame-hardened ends, and their seats are manganese steel.

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The Type H Crusher is available in sizes 8" x 12" to 24" x 36" and is fully described in Bulletin 1105. Send for a copy, today!

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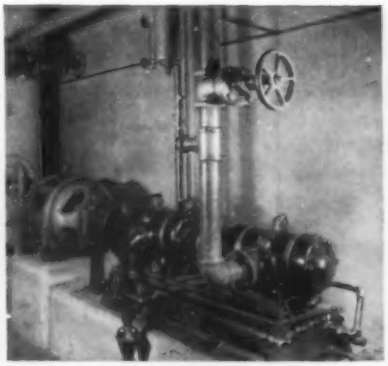
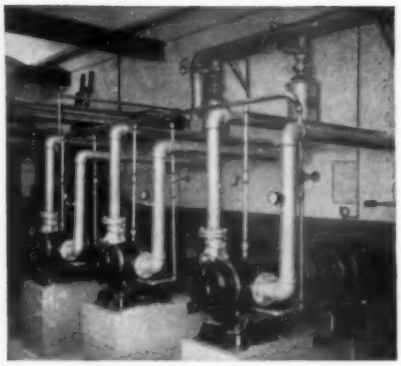
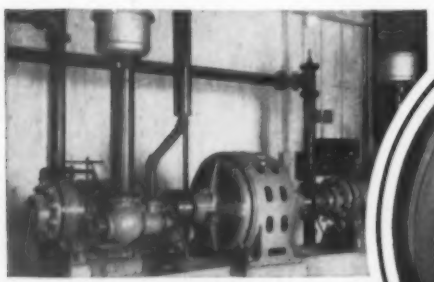
GAS INDUSTRY–Single-stage gas compressor 756 c. f. m. (1,088,640 cu. ft. per day.)



INCINERATOR PLANT–Two-stage compressor, 234 c. f. m. actual free-air delivery, 100 lb. pressure.



GLASS MFG. PLANT–Single-stage vacuum pumps, capacity each 217 c. f. m. at 26" vacuum.



CEMENT PLANT–Single-stage, duplex unit, common motor drive, capacity better than 2000 c. f. m. up to 30 lb.

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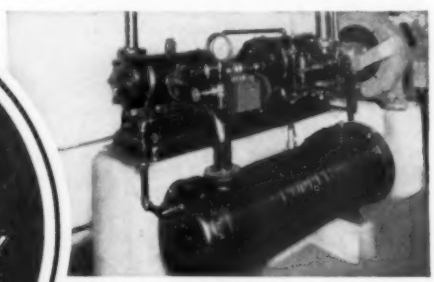
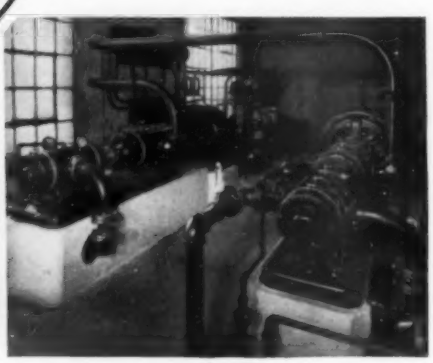
ROTARY COMPRESSOR
AND
VACUUM PUMP
APPLICATIONS
FULLER COMPANY
CATASAUQUA, PA.
YOU TOO CAN PROFIT BY SUCH AN INSTALLATION



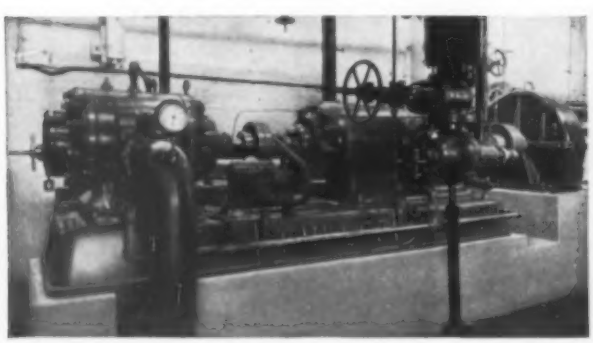
FOUNDRY–Two-stage compressor, 330 c.f.m. actual free air delivery, 100 lb. pressure.

FOOD PRODUCTS–Two-stage compressor, 1000 c. f. m. actual delivery, 100 lb. pressure.

REFINERY–Single-stage compressor, 125 c. f. m., 15 lb. pressure.



CEMENT–Two-stage compressors, capacity 740 c. f. m. each, 100 lb. pressure.



COPPER REFINERY–Two-stage compressor, geared turbine drive, 1775 c. f. m. actual free air delivery at 650 r. p. m., 100 lb. pressure.

SEWAGE DISPOSAL–Two "air-cooled" sewage agitation compressors, each rated 1750 c. f. m., 8.4 lb. average discharge pressure.

C-35

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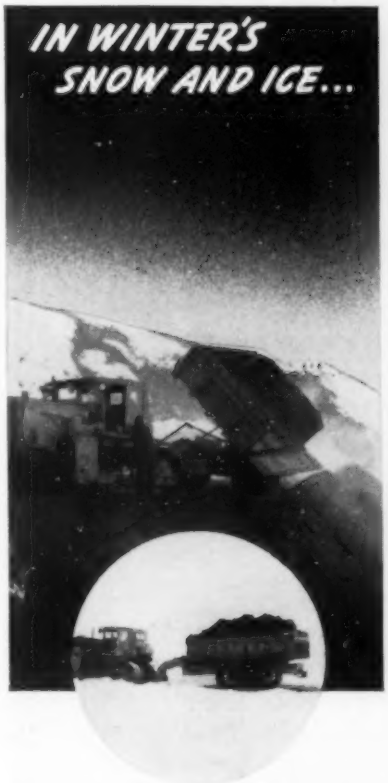
every day in the year

Athey Forged-Trak 2-Way Dump Trailers work *consistently* and profitably throughout the year. That cuts down investment in hauling units and keeps experienced workers busy in all seasons.



Fast, clean, positive dumping, either to right or left . . . you don't have to carry part of the load back from the dump. Ice chunks and slippery ground have no effect on the broad tracks of Athey units.

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From body-top to wheel-tread, Athey Forged-Trak 2-Way Dump Trailers are built to cope with "nature in the raw." See your "Caterpillar" dealer or write us!

ATHEY TRUSS WHEEL CO., 5631 West 65th Street, CHICAGO, ILL.
Cable Address: "Trusswheel," Chicago

SEE YOUR "CATERPILLAR" DEALER

ATHEY

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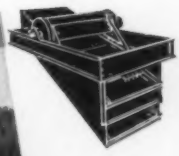
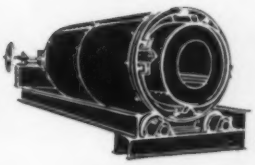
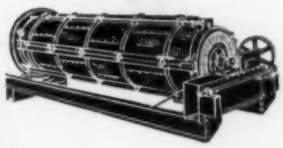


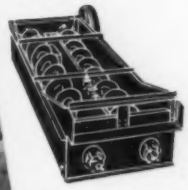
PULSATORS



WASHING SCREENS

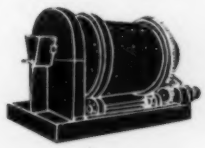


DRY SCREENS



SCREW REWASHERS

LOG WASHERS



SUPER SCRUBBERS

BELT & BUCKET CONVEYORS

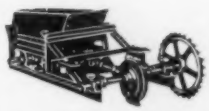
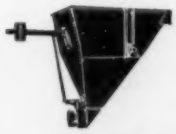


PLATE FEEDERS



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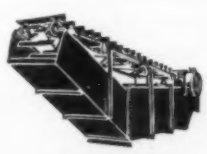

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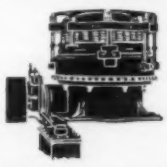

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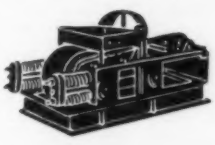

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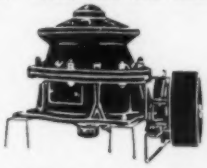

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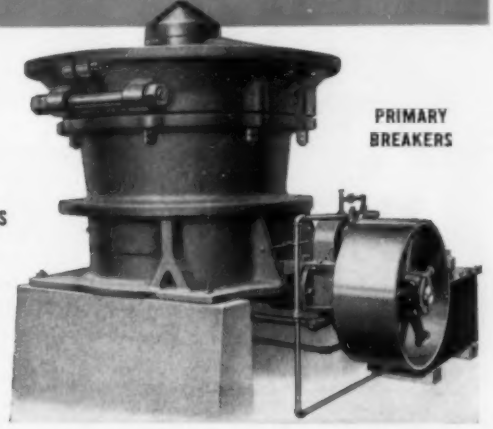

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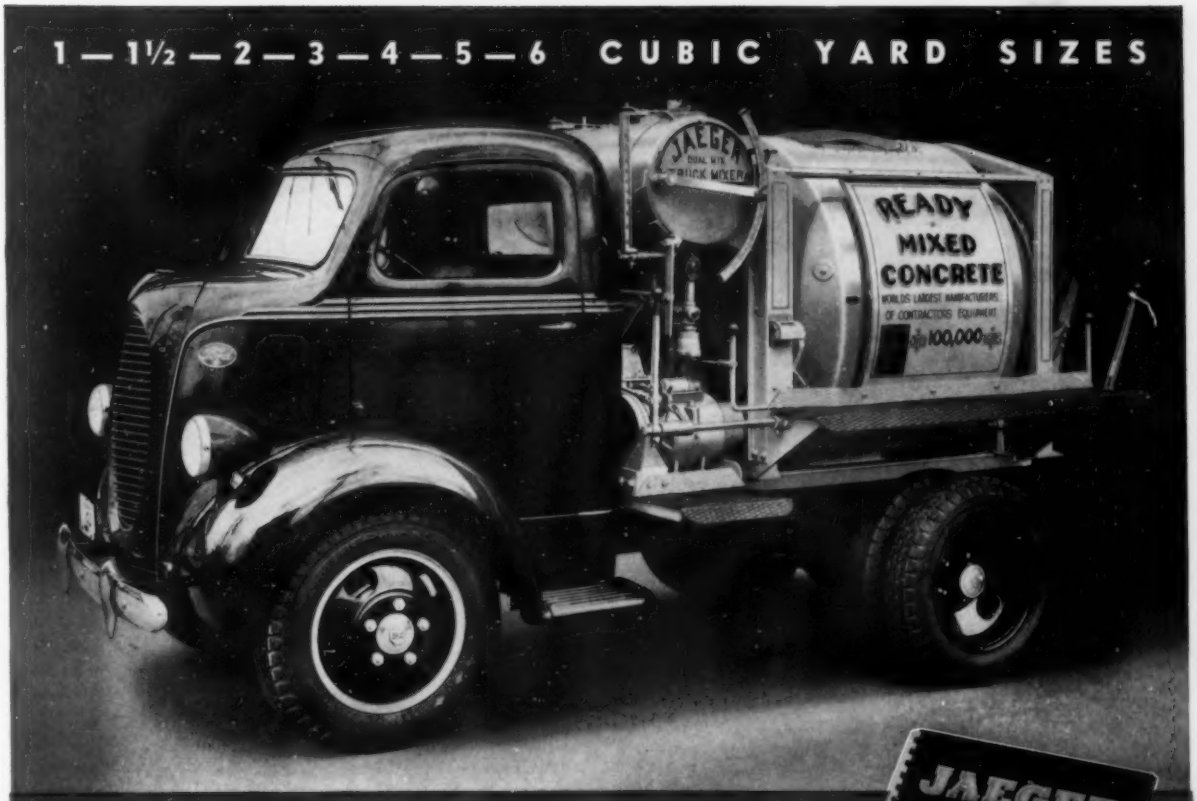

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Today, alert business men who have seen the opportunity and studied the methods of successful operators, are buying Jaeger Truck Mixers. THERE ARE MORE JAEGER TRUCK MIXERS AND AGITATORS IN USE TODAY THAN ALL OTHER MAKES COMBINED.

THE JAEGER MACHINE CO., Columbus, Ohio

SEND FOR YOUR COPY — NEW 68-PAGE DATA BOOK FOR READY-MIXED PLANTS JUST OFF THE PRESS!

Whether you are already operating a ready-mixed plant or planning to start one, you will find this book an invaluable guide and reference on modern truck mixer and agitator operation, compiled by the world's largest manufacturer—up-to-date, authoritative, complete.

THE JAEGER MACHINE COMPANY
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We are interested in 1939 data on Ready Mixed Plants with Truck Mixers and Agitators, including set-up, operation, maintenance costs, selling of strength concrete, etc., as well as new developments in mixer design.

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means much to plant operators and to equipment manufacturers. The producers get a clearer idea of what the users are trying to secure. The users get a clearer idea of the limitations of practical processing. This will result in simplification and standardization which

Creates Sales

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For Advertisers

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YOU WOULDN'T USE LOCOMOTIVE OIL FOR A WRIST WATCH!

WIRE ROPE, too, requires a proper lubricant!

HAVE YOU ever stopped to think that WIRE ROPE IS A MACHINE WITH MANY BEARINGS! In the average single length of wire rope there are thousands of wearing surfaces—where wire moves against wire.

Only the right kind of lubricant, properly applied, will not only protect the outer surface of the rope—but also get down below the surface, to keep those internal rope-wire "bearings" from wearing out or corroding.

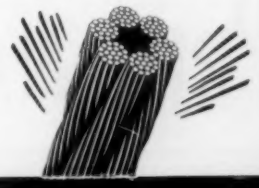
Lubrication at correctly determined intervals, with the *right* wire rope lubricant, maintains rope safety—lengthens rope life.

For full information regarding a wire rope lubricant exactly suited to your own particular equipment and operating conditions, consult the nearest Roebling office.

This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service, and efficiency from their wire rope.

Enjoy these advantages of proper wire rope lubrication:

1. Maintenance of rope safety
2. Longer rope life
3. Less wear on drums and sheaves
4. Increased operating efficiency



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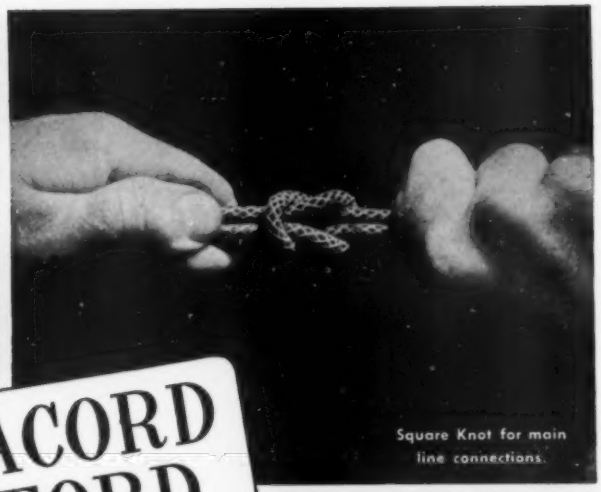
ROEBLING "BLUE CENTER" WIRE ROPE

Plain Primacord. Also made in Reinforced and Wire Bound



Square Knot for main line connections.

PRIMACORD ·BICKFORD Detonating Fuse

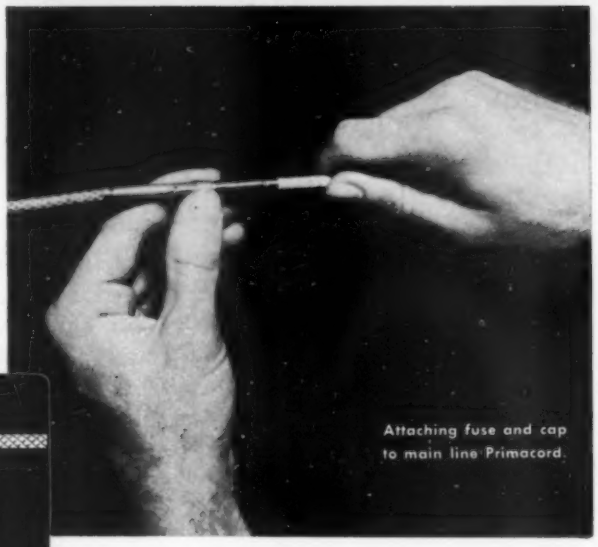
Reinforced Primacord attached to cartridge.

Half Hitch used in connecting branch line to main line.

PENTAERYTHRITETETRANITRATE* —hard to pronounce but easy to use

Primacord has broadened the use of detonating fuse. Because of its special textile covering—light, flexible, waterproof, strong—it is very easy to use. No special tools are required. Because of its core of *PETN it detonates along its entire length at a speed of 3.9 miles per second. This speed is practically instantaneous, yet permits shots planned to relieve burden, resulting in better fragmentation—more useful work from the explosive charges.

Full details are contained in the Primacord Booklet — free upon request. THE ENSIGN-BICKFORD COMPANY, Simsbury, Conn. Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse Since 1836.



Attaching fuse and cap to main line Primacord.

PB-8

PRIMACORD·BICKFORD *Detonating Fuse*

The World's Longest Belt

Inaugurates a new era in low-cost hauling

TODAY at Grand Coulee Dam Goodyear rubber is teaching industry a new lesson in the economical transport of bulk materials. There the longest belt the world has ever seen—a continuous rubber conveyor almost TWO MILES long—can haul 2,000 tons of stone aggregate every hour from the screen house to the dam site nearly a mile away.

This gigantic conveyor, a single Goodyear belt weighing 80 tons, operates on centers of 4,835 feet. One hundred and twenty-five horsepower is required to start the empty belt. Once loaded, the belt actually generates power because of the favorable 3½% downgrade. It provides a continuous, uniform delivery of aggregate from stock piles one mile away, to stock piles adjacent to the dam site.

Never before has such great tonnage been carried so far by a single belt. But Goodyear *knew* it could be done because Goodyear's technical progress in rubber has been steadily multiplying conveyor belt capacity by millions of tons.

Long distance conveyor haulage offers great new possibilities in moving coal, ore and other tonnage materials at low cost over ground where other transport is infeasible or impracticable. A series of such belts can operate over a distance of many miles.

But even if your problem be only the conveying of empty cartons down a packing bench, or gravel from pit to grading screens, *you can do it better with Goodyear rubber!* Let the G.T.M.—Goodyear Technical Man—prove it to you. Just write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

Centennial of Charles Goodyear's discovery of vulcanization

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Buell Dust Collectors bring you that combination of high efficiency and low cost which the patented Van Tongeren system is demonstrating in more than a thousand installations.

Those installations are earning the good will of workmen and of entire communities. They are earning equally important and more tangible profits in the salvaging of valuable dusts, the processing of a great variety of products, the reduction of many operating and overhead costs.

For a clear, practical presentation of dust collection or fly ash correction ask us for *Bulletin D81* (on industrial dusts) or *Booklet A93* (on fly ash). Either, or both, will be sent free to any managing executive or operating engineer.

The Only Cyclones with a Dust Pocket

BUELL ENGINEERING COMPANY INC

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DUST COLLECTORS

ROCK PRODUCTS

The Pendulum Swings

"The flighty purpose never is o'ertook,
Unless the deed go with it."
—Shakespeare's Macbeth.

The gullibility of us Americans is proverbial. We are always seeking short cuts to what we momentarily conceive to be desirable objectives. It is not a mean attribute; it shows we are an ambitious and optimistic people. But it results in progress by spurts and relapses rather than by logical analysis and persistent pursuit. Even the advocates of "planned economy" have depended on emotional appeal to put it over!

The evident governing emotion following the 1929 collapse was resentment against the leadership of "money changers" and "economic royalists," as they were gleefully termed by their successors. For a while our pre-1929 leaders appeared to show the way to satisfy that very popular desire to get something for nothing. When the people found that they had merely been "gypped" again, they were resentful, even though seeking the impossible.

We turned then, quite naturally, to political leaders who promised a new era, and above all things, "security." Just what is security? The dictionary says it is "the condition or quality of being secure, freedom from fear, anxiety, or care, confidence of power or safety, freedom from risk, danger, harm." Our new leaders, preaching collectivism, promised collective security. After more than six years, the only security under the above definition we have achieved is "freedom from care," for the future—by the questionable means of unlimited borrowing for the present.

Fortunately, while we are gullible as a whole we retain some horse sense as individuals. So savings bank deposits and life insurance sales have increased tremendously, notwithstanding. With just as many unemployed, and with far more on the public payroll than in 1933, those with real jobs are beginning to be skeptical of getting something for nothing through this new political leadership. There are growing evidences of just as great a resentment to come against the people's present "gypping" as there was against the previous one.

One of the evidences of the swing of the pendulum is a changing public attitude toward organized labor. The new leadership attempted to intrench itself by reliance on class warfare. Consequently it encouraged labor leaders to organize labor. Unfortunately, this political leadership was not discriminating in its selection of labor leaders, so-called; nor of the methods these labor leaders used to secure funds and votes. Moreover, it was not very intelligent in its labor legislation. Because of these handicaps organized labor muffed some real opportunities.

In Minnesota, Wisconsin, Michigan, Missouri, Illinois, Michigan and Oregon, and probably in other states, laws already have been passed, or are about to be passed, restricting sit-down strikes and generally reëstablishing the rights of workers, owners and employers. So, whether the Wagner act establishing the so-called National Labor Relations Board is amended by Congress or not, the indignation of the people is asserting itself. Honest workers everywhere are helping to curb the activities of labor racketeers. They are learning that slavery to such is no gain; their interest and public interest is the same.

Once, after they had given enthusiastic support to this new political leadership, quite a few business men favored federal regulation of sick industries like bituminous coal—legislation described at the time of the passage of the Guffey act as designed "to save coal operators from the results of their own follies." Now, coal operators themselves see no hope of "stabilizing" the industry by government regulation and legal price-fixing—there is no escape from their own follies, no something for nothing. Moreover, they are getting tired of closed shop and check-off, which provide the chains by which both their long suffering workers and themselves are shackled.

Even the professors are wavering in reliance on a new era. More and more business men are being called to Washington to try to stem the leaks in the ship of state. Meanwhile, back in the colleges the professors who stayed at home to teach youngsters instead of going to Washington to teach industry are becoming alarmed lest their salaries stop. Witness the following advertisement in a recent issue of the Chicago *Journal of Commerce*:

Wanted: A BUSINESS MAN
Willing to Become
A COLLEGE PRESIDENT

An 80-year-old college seeks for its president a man with business experience. This college has advanced itself during the last three years. Its educational program promises to attract national attention. It now needs a man who can strengthen its financial program. The board of trustees believes it can find this president only in the business world. He will have full authority to build in his own way. He may, if he wishes, retain other connections and give only part of his time to this job.

Nathan C. Rockwood

Fine Grinding With Fewer Cement Mill Units

Modernize Medusa's Bay Bridge Plant

By BROR NORDBERG

An entirely new clinker grinding department has just been completed by the Medusa Portland Cement Co. at the Bay Bridge, Ohio mill, which is typical of what must be done to the older plant in order adequately to meet specifications for cement.

This mill was built in 1895, but was entirely rebuilt during the years 1924 to 1927, except for the clinker grinding department. The plant, which is one of the very few now using marl as raw material, is a wet process arrangement.

Four of the six 8- x 100-ft. kilns are now in operation, with a combined daily output of 2000 bbl. of clinker. From the kilns, the discharged clinker is passed through 30-ft. rotary coolers, water-sprayed, and is ready for the grinding mills at 140 to 160 deg. F.

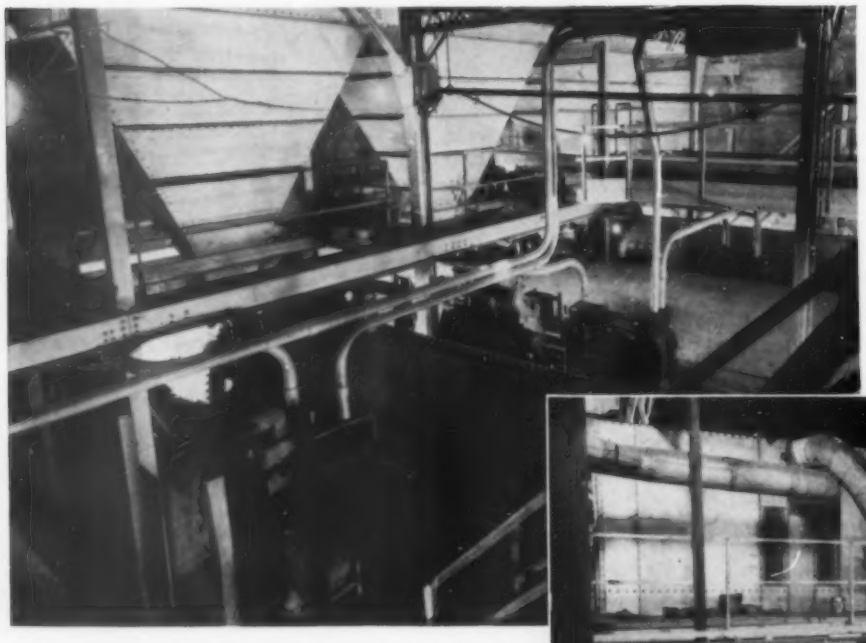
Changes In Grinding Make Finer Product

In the original layout, clinker was pulverized through six Kent mills followed by six 5- x 22-ft. tube mills, all in open circuit. With this arrangement, cement was ground in the preliminary mills to about 30 percent passing a 200-mesh sieve, and the tube mill finished product was 89 to 90 percent minus 200 mesh. Capacity of each tube mill was 30 bbl. per hour, but the highest specific surface obtainable with reasonable capacity was only 1450 sq. cm. per gram. Lack of suitable feeders to feed the tube mills uniformly was a drawback.

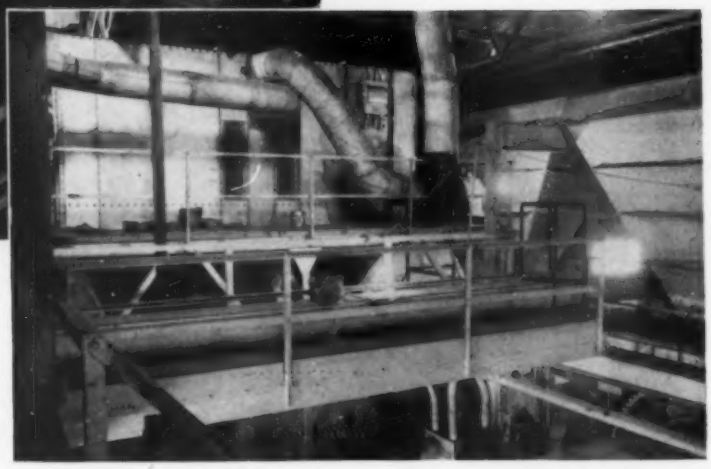
With the new mill arrangement, completed early in 1938, the original mill has been entirely superseded, except the tube mills proper. The six small preliminary mills have been replaced by two larger capacity Hercules mills, one tube mill has been taken out of service, and the finish mills are now operated in closed-circuit with air separators. The finish grinding arrangement is very similar to others used in the cement industry, differing in some respects because of building limitations.

A Peck conveyor takes the clinker cooler discharge at 350 deg. F directly into the preliminary mill feed bins. The clinker temperature is rather high as it leaves the cooler, but with the large capacity mill feed bins and operation of clinker grinding department on a 12-hr. interval out of each 24, the temperature of the clinker is reduced by the time it enters the mills to between 140 and 160 deg. F., but the mill output is satisfactory. Each of the bins has a capacity of 600 bbl. of clinker, and the gypsum bins combined hold 40 tons.

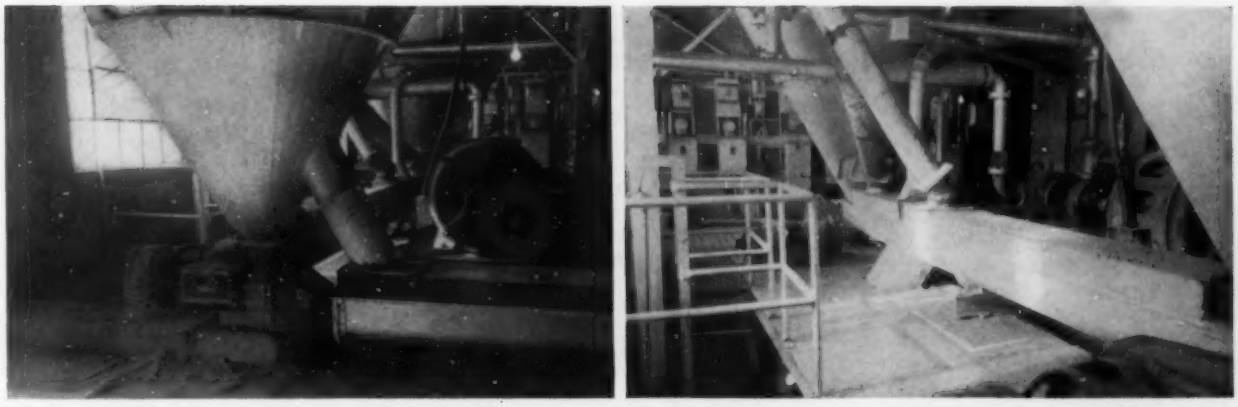
Instead of gypsum rock, a partially-calcined gypsum is ground with the



Left: General view of rebuilt clinker grinding department, showing tube mills and new, individual feed bins



Right: New cloth-type, automatic discharge collector in finish mill. Collector ducts are arranged to relieve pressures built up in the air separators



Left: Unique separator installation with the discharge of fines and rejects into conveyors on the mill room floor level. Right: Two air separators on the main floor level, discharging to right- and left-hand screw conveyors which empty through the chute in the center to a hopper feeding a 6-in. cement pump. Note ducts into screw conveyor to relieve air pressure

clinker. This product is fine, practically all passing a 24-mesh sieve, and is devoid of all moisture. Because of its uniformly fine grains and lack of moisture, this material flows evenly from the bins on to the table feeder which is synchronized electrically with the feeder putting clinker into the Hercules mill.

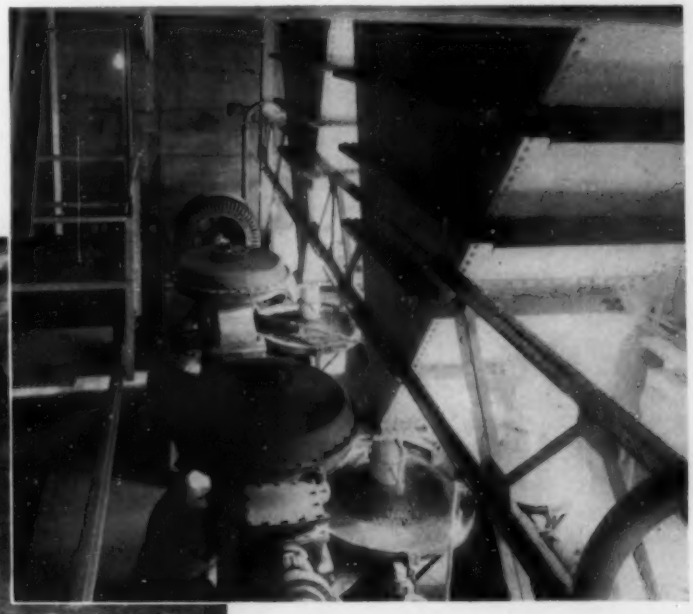
Two preliminary mills have been installed, each driven by a 350-hp. Westinghouse synchronous motor through Falk couplings. The hourly output through each mill is about 140 bbl. of product, passing a 14-mesh screen cloth, with a feed of clinker averaging 140 to 160 deg. F. in temperature and oil well temperature as high as 500 deg. F. Fineness of the preliminary mill product is 50 percent through 200-mesh and 68 to 70 percent minus the 100.

Preliminary mill discharges go to a 16-in. gathering screw conveyor, followed by a bucket elevator, and then to a 16-in. distribution screw conveyor, provided with a circular screen, which passes it into the tube mill feed bins. New, individual 125-bbl. steel feed bins were built. In the old setup, there were no bins, the feed being through small hoppers and an adjustable slide into a short screw conveyor which discharged into the tube mills. In addition to the five new hoppers, a sixth, of 135 bbl. capacity, serves as a reserve in the event of shutdowns of a minor nature in the preliminary grinding. Clinker from this bin is then drawn into a horizontal screw conveyor which puts it into the same elevator carrying the Hercules mill product into the several mill feed bins.

Dust Collector Installation

To recover dust and relieve the air pressure built up in the preliminary mills and the elevator, a Parsons bag-type dust collector has been installed. The collector handles 4100 cu. ft. of air per minute, and has 2000 sq. ft. of cloth surface. It is a dual unit so designed that one-half of the collector is closed while the other is being shaken down. Recovered dust returns to the screw conveyor handling tube mill feed from the 135-bbl. reserve bin passing into the

Right: Looking down on the two new preliminary clinker grinders. Table feeders may be seen below the mill feed bins, to the right



Left: Dust collector operating in connection with the preliminary mills and the elevator which carries the mill discharge into tube mill feed bins

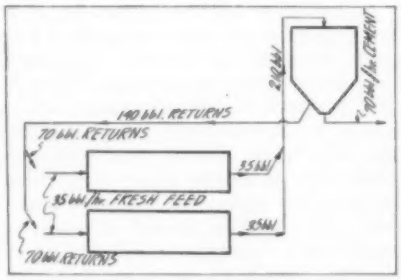
bucket elevator. The tube mills are center-fed through dog-leg (screw) inclined feeders driven by individual, direct current, variable-speed motors. The feeder has a speed range of 16 to 32 r.p.m. By this method, the feed is readily adjusted and controlled.

Air Separators Installed On Mill Room Floor

Four tube mills are closed-circuited in pairs, by bucket elevator and screw conveyor, with two 14-ft. air separators. Air separators are usually installed high overhead, but in this installation they are on the mill floor and finished cement as well as tailings discharge to screw conveyors on the mill room floor. At first some difficulty was experienced because air pressure was being built up within the separators due to the fact that the separators discharged cement directly into the screw conveyor flights. This arrangement unbalanced the system and it was practically impossible to get a uniform product. By running a duct from the screw conveyor housing (cement) into a dust collector, this trouble has been corrected. The two separators discharge into right- and left-hand screw conveyors which carry the cement to a chute where it drops to a hopper feeding a Fuller-Kinyon cement conveying system. The duct to the collector is near the point of discharge into the chute. The dust collector is similar to the one used in the preliminary grinding of clinker, and handles dust generated from all sources in the finish grinding.

Tube mills discharge at the center to 16-in. screw conveyors feeding the common elevator and conveyors into the air separators. Two are operated with one separator in simple circuit, with the tailings returning by screw conveyor and elevator into the trunnion screw which takes the fresh feed from the dog-leg feeder and places it into the mill. The fifth mill can be connected in the circuit in place of either of the others in event of emergency, with proper adjustment of the tailings returns.

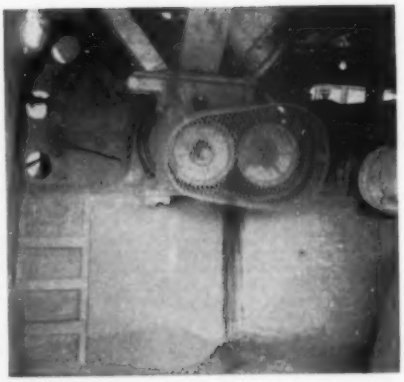
The new mill arrangement is producing about as much portland cement as before but with a specific surface of 1600 to 1700 sq. cm. per gram. Each tube mill produces 35 to 37 bbl. of cement per hour. The feed into the separators is 75 to 78 percent minus 200-mesh, and the finished product is 90 percent through 325 mesh. Circulating load is 200 percent, as shown in the accompanying flow diagram. The tube mills operate at 26 r.p.m., and the dog-leg feeder speeds are varied as the tailings increase or decrease. Each mill is charged with ⅞-in. steel balls to a level



Flow diagram of finish grinding

6-in. below the mill center line. In the previous installation, the tube mills were partitioned, with 2-in. balls in 7 ft. of length, followed by a 15-ft. section with ⅞-in. balls.

Finished cement is placed in silo storage by a 6-in. Fuller-Kinyon pump with a 5-in. discharge. The pump is a low pressure unit with an individual Fuller rotary compressor which operates at 25 p.s.i. pressure under normal conditions. Pressure adjusts itself according to load fluctuations on the pump, and the compressor is driven by a 50-hp. motor through a Link-Belt speed reducer.



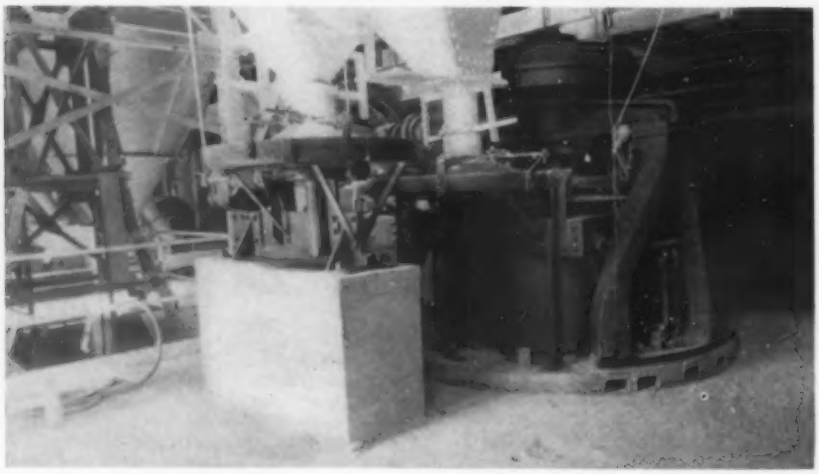
Short stub dog-leg feeders discharge the mill feed (finish) into the trunnion screw. Note spout for returning separator rejects into the trunnion screw

Practically all drives in the new mill are direct through Falk cut spiral gears, most of which have a reduction rating of 14.2:1. The entire installation represents about 300 hp. in added connected power, but the actual power demand in kilowatts is about the same as in the old mill. Finish mill and raw grinding departments each have a capacity of 4000 bbl. daily. This is double the kiln capacity, but as a rule each of the two departments is operated separately.

In addition to these improvements, Medusa has provided better facilities at the mill for the benefit of the workmen. In the locker room, 170 individual lockers, convenient circular wash fountains, and partitioned showers of the latest design have been provided.

No Change In Operations Preceding Grinding

Operations preceding the grinding of clinker have not been changed. The plant is wet process with marl and some clay and limestone as raw materials. These are all available within a radius of seven miles and are hauled by industrial cars to the crushing plant. About 450 tons per day are put through a Dixie Mogul crusher and placed in storage. An overhead crane handles this product into tanks over two kominuters. The kominuter product is put through 5- x 22-ft. tube mills, the final product containing 40 percent moisture. Disc-type filters reduce the moisture to 28 percent in the cake which is fed into the kilns. The kilns are fired by three 44-in. Fuller mills and the fuel ratio is about 125 lb. of 11 percent ash Ohio coal to a barrel of cement. All the recent installation work was completed by the plant force under the supervision of Medusa engineers.



One of the Hercules preliminary mills showing synchronized feeders for gypsum and clinker. The hourly output through each mill is about 140 bbl. of product, passing a 14-mesh screen cloth

Washing-Classifying Sand

Part 1—On Theory and Practices of Washing

By EDMUND SHAW

All sands do not have to be washed, or if they are washed it is sometimes profitable to put some of the clay and silt back. Some masons demand a small amount of clay in plastering sands, to make it trowel well, and clay is essential to moulding sands. But for making concrete, for use in filter beds, and for many other uses sand must be thoroughly washed to be satisfactory in use.

Modern washing—meaning a process so under control that the product will meet definite specification requirements for the amount of clay and silt remaining in the sand—is comparatively new. It goes back only to the latter part of the Nineteenth Century, when mortars and concretes began to be made with an understanding of the principles involved. One of the first of these is that the materials shall be reasonably clean.

Three Ways of Washing

There are three methods of applying wash water to raw materials and removing it with the clay in suspension. They are:

(1) Washing by filtration, in which the water passes through the bed of granular material.

(2) Washing by dilution and decantation, in which the water and suspended clay are drawn off from the settled grains of the material.

(3) Washing by displacement, in which the stream of material to be washed, mixed with water, flows over a slowly rising upward current of clear water into which the sand grains settle while the clay floats away.

Filtration is the usual method of washing gravel, crushed stone and similar coarse material. The pieces must be large enough so that the water will flow through them without leaving much of any clay behind. Washing gravel in a revolving screen is the commonest example. The pebbles are rolled over and over in the screen while strong sprays of water play on them. If sand is present, as it almost always is in the first wash, it goes through the screen with the clay and the water. Rinses are given in the succeeding screens as the product is sized.

In such screens there are three distinct operations going on at once, scrubbing, washing and sizing. That they *are* distinct and separate operations must be kept in mind if the operator wishes to improve his product. If the scrubbing is poor it is better to put in a preliminary scrubber, or to fit up part of the screen as a scrubber, than to change speed, or screen medium, in the hope of getting better scrubbing that way. If the pebbles show a clay coating the remedy is more water and a stronger spraying force, and not more scrubbing (a common mistake). And if the screening is not good the correction should be made in the screen itself, either by changing the medium or varying slope and speed until the best condition is found. The writer has more than once seen efforts to improve the product fail, because the three-fold purpose of the screen was not wholly understood.

Dilution and Decantation

Sand cannot be washed like gravel because the grains form a filter bed that lets water through but holds back clay. So the method of dilution and decantation is employed.

To wash by this method the material and the water are run through some kind of a settling vessel which is provided with an overflow. The vessel has to be large enough so that the flow is slowed down to where the sand grains are not carried away with the current. They settle to the bottom and the clay goes out with the overflow water. Some clay remains in the sand, because all the clay is thoroughly mixed with all the water, and the water remaining in the voids of the sand carries its proportion of clay.

In some industries the process is intermittent; that is, the flow is kept running into the box or vessel until it is almost full of sand. Then the flow is stopped and the excess water drawn off and the sand is later excavated by a clamshell or similar bucket. This method has been used in the sand and gravel industry, but it is crude and expensive, and the sand produced is unevenly graded because the coarsest sand settles closest to where the feed enters. However, in recent years, since it has been found necessary to save fine sand, this method has been applied to the recovery of fine sand in the overflows from washing the coarser sand, with some success.

In better plants, sand washing is continuous. Sand recovery devices are divided into two classes. The first is made up of the tilting boxes and cones and inverted pyramids from which the settled sand flows by gravity from a discharge orifice. The second class is composed of settling basins from which the sand is removed by mechanical means, as by wheels, buckets, drags, rakes and screws. As far as removing the clay is concerned, one class does about the same work as the other, but the machines of the second class take less head room and the product is dryer.

In the first class, the bed of settled

The Author

READERS of Rock Products of 15 to 20 years ago need no introduction to Edmund Shaw, nor he to them; but as he says, a new generation has come into the picture since then, and he feels he needs an introduction to these newcomers. So, of himself he writes:

"My interest in classification began when I got a job in a cyanide plant, at a gold mine in Arizona, in 1901. Later, with the Allen Cone Co., then just Mr. Allen and myself, I was very happy designing and installing classifiers, some of them as large as 18 ft. dia. and 18 ft. deep.

"Then I became interested in making better concrete sand. I was in Washington, D. C., in the early 1920's when Guy Sutton was secretary of the National Sand and Gravel Association. I met a few well-known producers in his office and explained to them the possibilities of classification; and I prophesied that in a few years they would be turning out 'prescription sand,' made to any required grading. They listened politely and said there might be something in the idea, but they did not think their customers would ever pay for such refinement. Today such sands are made by many companies, and their customers pay no more than they paid for the 'take it or leave it' kind.

"It was John Prince, Kansas City, who gave me the chance to do many things with classification of sand, not only making 'prescription' sands, but to use classification to remove lignite from sand; and to invent and patent the Shaw classifier.

"This removal of lignite was a good example of what classification can do commercially. Originally the plant where it was done was selling about 40,000 tons of Missouri river sand a year. The second year after the classifiers were installed the sales jumped to 200,000 tons a year.

"During the years that I visited plants in all parts of the country as an editor of Rock Products, I was always interested in sand preparation and recovery, and was sometimes able to offer a suggestion to a producer which helped him with his sand problems. This series of articles records not only the results of some years of direct observation and experience, but of more years of thought and study."

Mr. Shaw started this series of articles last fall and is still at work on them.—THE EDITOR.

sand is kept rather high so there is not much room for dead water in which the clay would settle. This is not so necessary with wheel, bucket, drag, rake and screw washers, for the agitation keeps the clay from settling.

The completeness with which the clay is removed depends on several things, but principally on these three:

(1) The clay must have been scrubbed from the grains so that it is all in suspension in the water.

(2) The water must be sufficient so that the portion that remains in the voids of the settled sand will not contain too much clay.

(3) The washing machine or device must be designed with proper proportions to handle the feed.

In addition, to secure good results, the percentage of clay in the water must not be so high that the water becomes a viscous medium through which the grains of fine sand will settle too slowly to be caught.

Scrubbing Sand

Only the principles of scrubbing will be discussed here, leaving the description of the machines for a later chapter.

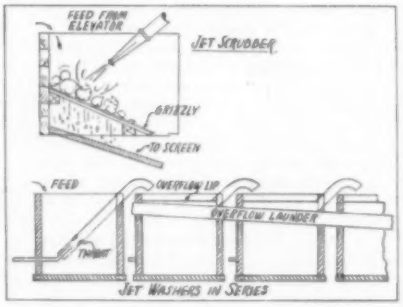
Some sands are much harder to scrub than others. The natural sands washed for making concrete do not hold the clay very tightly, as a rule, and the scrubbing given the gravel and sand before they are separated by the sand screen is usually enough. But this is not always the case. I recall some deposits in the Southern Atlantic Coastal Plain where sands were very difficult to scrub. The clay was a light yellow and very sticky, and the grains of sand were much pitted.

Similar conditions are found in the Tennessee phosphate rock field. Scrubbing by hand in the laboratory, one had to give several washes, scrubbing after every wash, before the water would come clear.

Silica sand, which has to be very thoroughly washed to be used at all for glass making, probably offers as great difficulties as any sand. Simple methods suffice for the sands in the New Jersey deposits, but the sands which have become consolidated into a friable sandstone, as in the Pennsylvania, Maryland and West Virginia deposits, have to be crushed and then ground in a mill of the chaser type. There is a strong scrubbing action to this type of mill because the outer edge of the roll has to move faster than the inner, and this causes the roll to slide as well as revolve.

For coarse materials, gravel and crushed stone, the log washer, the washing cylinder and the washing trommel are much in use, as they have been for many years. The commoner sand scrubbing machines are the screw washer, the drag belt and the rake classifier, used more for classifying sand then for scrubbing, and they will be described in the chapters which deal with classifiers.

There is, however, a class of sand scrubbers and nothing else, the jet scrubbers. There are two kinds of them. One consists of a box or a cylinder into which the material to be scrubbed is fed in such a way that a strong jet of water plays upon it and also furnishes the water which conveys it to the screens. It is not uncommon to see some arrangement of the kind at the head of a sand and gravel plant, receiving the discharge of the first elevator. Usually not much effort is made to design the arrangement so that the water is most efficiently used. The box into which the elevator discharges should be narrow and deep enough so that gravel will settle in the bottom to provide a bed over which the washed material will flow.



One such jet scrubber, in a New York State plant, had a grizzley bottom, made of 32-lb. rails, fanned out a little to prevent pieces from being held. The spacing was ¾-in. to 1½-in. as I remember. The fines went through at once, and the lumps of clay and the large pebbles which were coated with clay, remained longer on the grizzley and received a more thorough washing. Fines and coarse went to the same screen, the grizzley serving only to hold the coarse pieces for more washing.

One would hardly design a new plant with such a scrubber, but where the scrubbing in the screen is found insufficient, and the addition of a mechanical scrubber could not be made without too much expense, it might pay to install it. The only cost of operation is the extra power that would be required to give the water sufficient force to knock off the clay, for it would have to be pumped to the head of the plant anyway.

The other form of sand scrubber is used only for sand, as it cannot be adapted for scrubbing pebbles unless it is made for large tonnages. It is an hydraulic ejector, working on the principle of the steam siphon or the boiler feed injector. There is a pipe with a "throat" of cast iron near the feed end, and a small pipe which discharges a jet of water at high velocity into the throat. This causes a suction which lifts the sand and water and forces it through the throat and on up the pipe.

As a lifting device it is not very efficient, one authority stating that the efficiency is only 15% to 30% of the power in the water jet. As ordinarily made and operated it is not a very good scrubber, either. About all the scrubbing the grains get is as they pass through the throat. But, if it is properly designed, both the scrubbing and the lifting are much better.

James Barr, engineer for one of the large phosphate rock mining companies, had several of these scrubbers in a plant which was under his management. He decided to redesign them to see if they could not do better work. So he made a throat that had the angles of a Venturi meter and used a jet of 125-lb. pressure. The efficiency was greatly improved, as it would be on account of having much less water to lift. The discharge looked to be about as dry as the discharge from an ordinary tilting sand tank. The scrubbing was better as there was more friction between the grains.

This type of scrubber has been used with some success in washing silica sand. One plant which I saw in Oklahoma had five such jets in series. They were made of pieces of 2-in. pipe about 2 ft., 6 in. long. Each took its feed from a box about 2-ft. square, provided with an overflow. The pipes were inclined so that each would discharge into the box ahead, and the sand from the last pipe was sent to a screw washer, or a drag, to drain it. The proprietor said he was thoroughly satisfied with the jet scrubber, which cost him very little to build and maintain, and required only a minimum of attention. Probably the clay did not adhere closely to the grains.

In times past this scrubber has had some use for cleaning sand that had been used in filter plants in municipal water works.

It is difficult to see how this scrubber could have any use in a modern sand and gravel plant, and it is included here mainly to have the review complete. However, there might be some opportunity for its use, especially where a lift as well as scrubbing was needed.

Theoretically, scrubbing should be complete before the sand goes to the dewatering machine which will separate it from the clay in suspension in the water. Practically more or less scrubbing is always done in the dewaterer. This is especially true of silica sand plants, and it is not uncommon to see as many as five screw washers in series, each scrubbing off a little clay as well as removing it by dewatering.

(To be continued)

Speeding Up Stripping

Dump Trailers and Tractor Reduce Cost of Removing Overburden

By BROR NORDBERG

Stripping is a continuous operation at the Wedron Silica Co. plant at Wedron, Ill., to keep sufficiently ahead of the quarry operations. A face of 110 ft. is being worked by a combination of blasting and hydraulicking to furnish the delivery pumps with an average of 200 tons of material per hour.

The entire area under work is covered by an average of 50 ft. of overburden which must be continuously disposed of well ahead of operations. Clay, sand and gravel and hardpan make up the bulk of the topsoil to be removed.

For a number of years an annual average of 100,000 cu. yd. of this material had been stripped and moved by two locomotives, one steam and one gasoline-engine powered, pulling industrial cars. These cars, operating over trackage, dumped the stripped material as fill in a worked out part of the quarry. The locomotives hauled five cars in a train, each car of 5 cu. yd. capacity.

These older type haulage units were abandoned in favor of a new haulage unit consisting of two Athey Forged-Trak 2-way dump trailers hauled by an RD-8, 95-hp. Caterpillar-Diesel tractor. Each trailer, also on caterpillars, has a capacity of 13-cu. yd., and they are hauled in pairs to the fill. The Caterpillar-Diesel has six gear speeds with a maximum speed of 6 to 7 m.p.h. in high gear, hauling a full load down a slight grade to fill.

Stripping excavation is carried on with a 1½-cu. yd. Link-Belt gasoline shovel which loads into the trailers. Under ideal conditions, loading is completed in eight minutes, and 14 minutes are required for hauling time, with a length of haul of 1000 ft. in one direction to the spoilage pit.

So far, the unit has handled on the average 850 cu. yd. in 8 hr. with a total of four men employed, or an average of four trips per hour. It is anticipated that the new haulage units will permit the removal of 150,000 cu. yd. annually. This compares with 100,000 cu. yd. of overburden removed annually by the former method which required six men.

Using the new haulage units with the gasoline shovel for excavation and loading, the total operating cost is approximately 3.8c per cu. yd., including labor of four men (including shovel operator), gasoline for shovel, fuel oil for the Caterpillar-Diesel engine and lubricating oil and grease for all equipment. This cost does not include depreciation of the haulage units as no experience is available over a sufficient period of time in which to calculate this cost factor. It is anticipated, however, that the depreciation, based on experience in other stripping operations, will not be much out of line with the average service of haulage units of this kind.

Aside from lower operating costs, installation of the tractor-trailers has enabled continuous operation and eliminated the delays required while extending and re-laying trackage for the older industrial cars. Normally, with the latter system, after each three days of operation with the shovel it was necessary to change the track and move the ballast—all consuming considerable labor. Another drawback to the use of trackage for this purpose was that heavy rains would wash away portions of the roadbed built near the edge of the spoil dump, necessitating costly relaying of track and further delays. While the locomotives and industrial cars under favorable conditions handled as much material per day as the tractor-trailer combination, the delays incidental to frequent removal of trackage to a new location reduced average stripping capacity very materially.

The new equipment, in service since January, 1939, does not require maintenance of a road-bed since caterpillars are used in place of wheels, but the quarry operator drags several sections of railroad rails behind the second trailer to help keep the road-bed smooth and clean. At the fill, discharge is controlled by the driver and it is not necessary to stop movement of the tractor.

Above: Removing heavy overburden from silica deposit. Link-Belt shovel loading Athey trailers which are hauled by a Diesel Caterpillar tractor. Center: Dumping material into spoil pit. Below: Discharging load from the first trailer. Plant may be seen in the background

Sand Dewatering Wheel In This New Plant

Radial Storage System for 150,000 Tons Capacity

By RALPH S. TORGERSON

At the southern outskirts of Lincoln, Ill., the Lincoln Sand and Gravel Co. has erected a new plant with a storage capacity of 150,000 tons and a loading out capacity of 15 cars per hr. It has a seven-compartment Kern radial storage system with several unique features which, it is believed, have been tried for the first time in connection with operations at a wet pit.

With the old plant, there was practically no reserve storage capacity. Excess production was moved by railroad cars and locomotive and then taken out by clamshell bucket for winter storage. Truck retail sales were handled by moving cars to a track hopper and elevating to bins. All this cumbersome handling of material is eliminated in the new plant. The new plant also provides means of blending any gradation of sand or gravel desired, and provides ample storage.

The raw material is a glacial deposit with 6 to 8 ft. of overburden, which is stripped with a 1¼-cu. yd. Northwest dragline and hauled away to an excavated lake with Koehring Dumptors. A gasoline-driven Caterpillar tractor and bulldozer facilities dumping, disposal and leveling of the overburden. The dredge has a 10-in. Amsco pump, driven direct by a G.E. 300-h.p. electric motor, with a 10-in. suction and 10-in. discharge pipe line to the plant. Material is pumped to the top of the screening and crushing unit where it is discharged to a fanning table, 30 ft. wide at the lower end. A vertical deflecting screen with 2-in. openings diverts the oversize to a collecting belt conveyor below, which carries it to a hopper feeding a 2- x 4-ft. Robins single-deck vibrating screen that rejects all 3-in. plus. The throughs go to a 2-ft. Symons cone crusher, the product of which is chuted to the main gravel conveyor leading to the sizing screens on the Kerns storage tipple.

Remove Excess Water With Dewatering Wheel

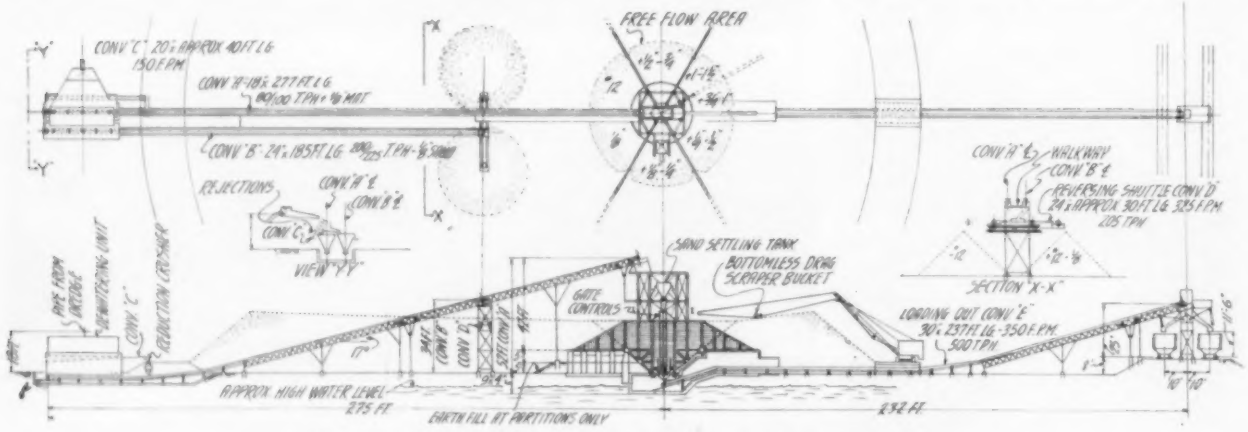
Following the deflecting screen, previously mentioned, is a screen with ⅜-in. openings which serves only as a wear-resistant intermediary for the succeeding ⅛-in. sand screen. The ⅛-in. minus material goes to one settling hopper and the ⅛-in. to 2-in. gravel goes to another settling hopper, the overflow water and silt from both being wasted back to the lake by chutes.

From the bottom of the gravel hopper, the material is chuted to a 2- x 6-ft. Robins vibrating screen to dewater the gravel and remove the surplus sand, which is sent to the dewatering wheel, plus ⅛-in. to 2-in. gravel going to the main gravel conveyor leading to the sizing screens on the storage and sizing tipple.

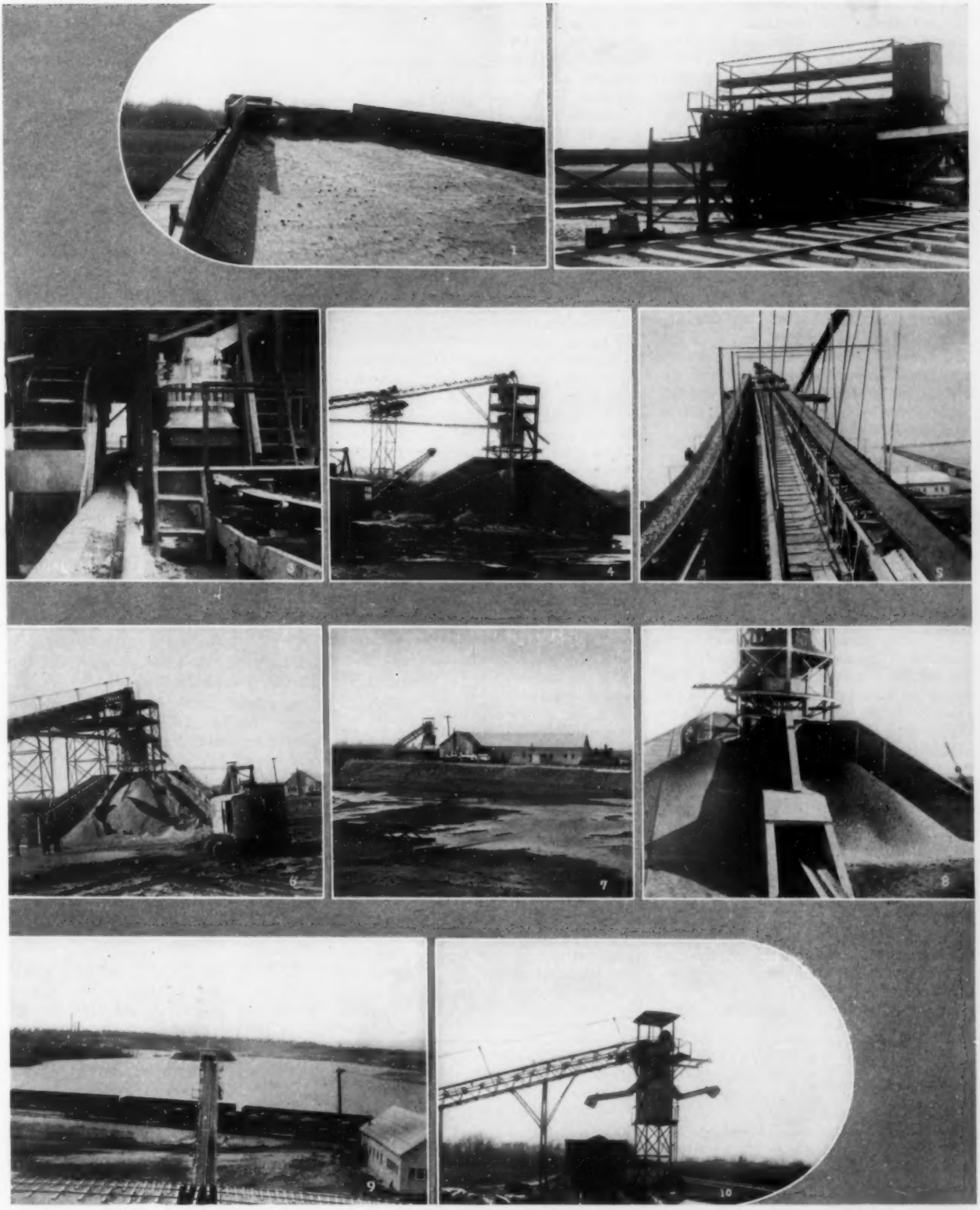
The sand is drawn from the sand-settling hopper and chuted to a specially designed Simplicity "D'Watering" wheel for the removal of excess water so that it may be carried up in sufficient capacity on the sand conveyor which parallels the gravel conveyor. The dewatering wheel is driven by a 10-h.p. G.E. motor, operating at 1200 r.p.m. through heliocentric gear reducer with a reduction ratio of 600 to 1, revolving the dewatering wheel at 2 r.p.m. This gear reduction unit is made by Universal Gear Corp., Indianapolis, Ind.

This dewatering wheel is 14 ft. in diameter and 3 ft. wide with 24 buckets, each of 4 cu. ft. capacity. The bottom of each bucket is lined with 12-mesh screen cloth over perforations through which excess water is taken off and wasted through the sump and a chute to the lake. While the arrangement now used reduces the water content of the sand satisfactorily, it is planned to reduce the moisture to not more than 15 percent when the sand is delivered from the dewatering wheel to the conveyor.

Sand from the dewatering wheel is fed to a 24-in. Robins belt conveyor, 185-ft. centers, which elevates it to a point near the storage tipple and chutes it to a 24-in. reversible shuttle conveyor, 30-ft. centers, at right angles to the main sand conveyor which deposits the sand for drainage. The shuttle conveyor permits the handling and separate storage of two grades of sand, a minus 12-mesh and a plus 12-mesh minus ⅛-in. product. These sand grades, after draining, are drawn into their respective free flowing storage compartments of the storage tipple by means of a slackline cable-way and scraper bucket



Plan and elevation details of new sand and gravel radial storage system



Views at the new Lincoln Sand and Gravel Co. plant. Fig. 1: Material from dredge pump line on tanning table. Fig. 2: Overflow from sand and gravel settling tanks flumed back to lake. Fig. 3: Dewatering wheel, to the left, and cone crusher to the right. Fig. 4: To the left may be seen reversible transverse conveyor to handle two sand sizes, and radial storage tipple to the right. Fig. 5: Gravel conveyor to the left and sand conveyor to the right, leading up to storage tipple. Fig. 6: Reclaiming sand with slackline cableway and scraper bucket to radial storage tipple, using crane for hoist. Fig. 7: Fill on which three-rail track has been laid for use by new electric hoist. Fig. 8: Loading out conveyor from storage tipple. Fig. 9: Looking from top of fill to end of loading out conveyor. Fig. 10: Electrically-operated chutes in loading out tower

of 1 cu. yd. capacity. The slackline and scraper bucket is reversible to draw material out of the free flowing area for reserve storage.

Gravel is elevated by an 18-in. Robins conveyor belt, 277-ft. centers, to the top of the storage tipple, which rises 53 ft. above the ground level. The first gravel sizing screen is a 3- x 8-ft. Simplicity triple-deck vibrating screen which has successively, 1-in., ¾-in., and ½-in. screen cloth. The material passing the ½-in. cloth is discharged below onto a 4- x 10-ft. Robins triple deck screen having ⅜-in., ¼-in., and ⅛-in. cloth. A rinsing spray is used over each triple deck screen. Five gravel sizes are produced by the two screens: 2-in. to 1-in., 1-in. to ¾-in., ¾-in. to ½-in., ½-in. to ¼-in., and ¼-in. to ⅛-in., all of which are placed in separate compartments in the Kern storage system by chutes, leaving two compartments for the two sand sizes.

Loading Out

At the present time a Northwest crane is used as a hoist to operate the slackline cableway and scraper bucket, but a specially designed, electrically operated hoist, is now being built by the company for operation on a three-rail, circular track 1200 ft. in circumference laid on fill which encloses the reserve storage area. As previously mentioned, the total storage capacity is 150,000 tons, and the free-flowing capacity of storage tipple is 200 cars of material in all compartments. This two-drum, two-speed Kern hoist will be mounted on an old locomotive truck frame and will be operated with a 50-hp. electric motor. A 15-hp. electric motor will propel the movable hoist car around the track, and will receive its power from a cable attached to the storage tipple tower by means of a sheave sliding over a ring with a counterweight to take up slack, and then extending to a tower on the hoist car. The operator of the hoist will control the hoist from the tower on the car which will permit clear vision over the top of the storage.

At the Kern storage tipple, the operator in the tower controls the loading out of material from the compartment bins below by vertical notched rods that operate the valves. This arrangement permits any desired proportioning of different sizes for blending by drawing materials into a mixing hopper that feeds to the 30-in. Robins loading out tunnel conveyor belt, 237-ft. centers leading to a loading out tower centered over two railroad tracks. A Syntron vibrator attached to a steel plate on the sand valves in the storage tipple facilitates the flow of the damp sand to the mixing hopper.

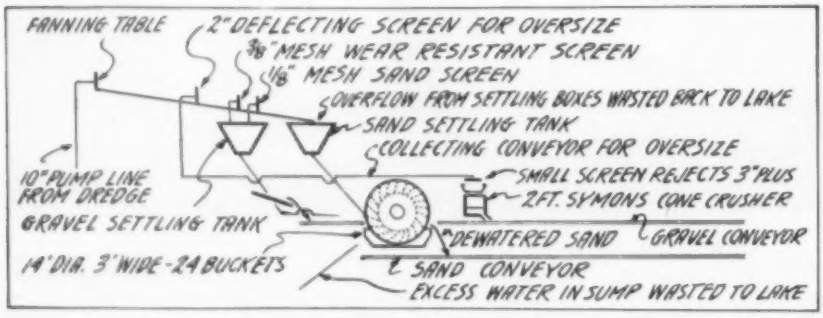
All conveyor motors are Crocker-Wheeler with Falk reducers. Electrical load comprises 325 hp. on the dredge, 153 hp. at the plant, and there will be 65 hp. on the slackline cableway hoist car, a total of 543 hp. Belting was furnished by the Hewitt Rubber Co. An intercommunicating telephone system permits easy control of all operations.

At the loading out tower are two electrically operated chutes to control the flow of material into cars on either track. The company operates its own railroad, consisting of two steam locomotives and 4½ miles of trackage. However, with the new plant it will only be necessary to use one of the locomotives. The railroad connects directly with the Alton Railroad, two branches of the Illinois Central and the Illinois Terminal Railroad. While the bulk of the shipments are made by rail, retail bins will be provided for trucks.

It is also planned to install an electric car puller, which will be operated from the loading out tower to control both empties and loaded cars. Scales will be under the loading tipple.

The present setup of the plant permits operation for 15 years without any major conveyor changes. By lengthening the conveyors, leading from the wet screening plant to the storage and sizing screen tipple, many more years of operation are possible. Two hundred acres have been excavated in a period of 35 years, and the deposit comprises 225 additional acres.

Officers of the company are V. O. Johnston, president; F. W. Longan, vice-president and treasurer; E. G. Johnston, secretary; R. E. Weaver, general manager, and H. D. Clouse, superintendent. Mr. Clouse was in charge of construction and participated in designing the plant. Fred T. Kern Co., Milwaukee, Wis., designed the radial storage system and furnished the structural steel members. All conveying equipment was furnished by the Robins Conveying Belt Co.


FANNING TABLE
2" DEFLECTING SCREEN FOR OVERSIZE
⅜" MESH WEAR RESISTANT SCREEN
⅛" MESH SAND SCREEN
OVERFLOW FROM SETTLING BOXES WASTED BACK TO LAKE
SAND SETTLING TANK
COLLECTING CONVEYOR FOR OVERSIZE
10" PUMP LINE FROM DREDGE
SMALL SCREEN REJECTS 3" PLUS
2 FT. SYMONS CONE CRUSHER
GRAVEL SETTLING TANK
DEWATERED SAND
GRAVEL CONVEYOR
14' DIA. 3' WIDE - 24 BUCKETS
SAND CONVEYOR
EXCESS WATER IN SUMP WASTED TO LAKE

Flow sheet of new sand and gravel plant showing how sand is dewatered for efficient handling on conveyors

House Movement Caused by Ground Vibrations

FOR THE FIRST TIME actual tests were made recently on a building to determine movement caused by ground vibrations. Details of this test were described in a report by J. R. Thoenen and S. L. Windes of the Bureau of Mines. The building is a two-story farm dwelling to which a wing had been added, the original structure being over 100 years old.

As a result of these tests, the following conclusions were drawn:

1. Vibration tests carried to destruction in this house caused plaster damage by relative movement between portions of the structure.

2. There was no conclusive evidence of damage from purely panel vibration.

3. Initial damage to old brittle plaster required a movement of 0.09 inch and later withstood a similar movement of between 0.2 and 0.3 inch without further damage.

4. Initial damage to new well-seasoned plaster required an estimated movement of 0.15 inch.

5. Reference to field tests in houses subject to seismic vibrations from quarry blasts and other sources showed no damage to plaster.

6. Field tests showed maximum movement in houses subject to vibrations from quarry blasts and other sources to be from one-third to one-eighth of that required to cause plaster damage in the test house at Mount Weather.

7. In 13 records of amplitudes measured in houses and caused by quarry blasts, the average amplitude was not more than 5 percent of the amplitude required to cause the initial plaster failure in the test house at Mount Weather.

8. While the positive tests herein described show that a far greater movement was necessary to cause damage than occurs in customary quarry operating conditions, the authors wish to emphasize that the house in which the tests were made was old and its parts were loosely coupled together. For this reason, the movement required cannot be applied directly as an index of destructibility for other more modern types of construction.

Article II on Crushing, Sizing, Testing and Specifying Aggregates

By ELWOOD T. NETTLETON*

Simplification Benefits

Much progress has been made in simplifying and standardizing specifications for aggregates, but a great deal remains to be done, particularly in selling simplified specifications to both consumer and producer. It shouldn't be necessary to have to sell the producer, but it is; we'll treat that in the next installment. Here we shall confine our efforts to giving the producer an outline of the arguments he may use to best advantage on his customers, for they must first be sold.

With simpler specifications to meet, and fewer sizes to make, the production cost is lowered. Consequently, the consumer buys at a lower price. With simplification a few standard sizes can always be kept on hand by the producers either for emergency or economy of operation. Therefore, the customer may obtain better service at all times. With fewer sizes to make the producer may concentrate on meeting a few specifications which are enforceable. As a result, the consumer has the assurance of receiving uniformity as to quality and sizing of successive shipments. With uniformity of quality and sizing the consumer or engineer is in a position to obtain comparative data, as far as stone is concerned, between various field jobs and laboratory tests.

The consumer can think of many objections. For one reason or another he has bias in favor of one or more specifications, or ways of designating sizes, etc. To show him what this means to the producer I list below some samples of the numerous systems of designation of sizes now employed:

(*a*) System of arbitrary numbers such as Nos. 1, 2, 3, etc., largest size being No. 1.

(*b*) System of arbitrary numbers such as Nos. 1, 2, 3, etc., smallest size being No. 1.

(*c*) System of arbitrary letters such as A, B, C, largest size being A.

(*d*) System of arbitrary letters such as A, B, C, smallest size being A.

(*e*) System designated by average size of stone.

(*f*) System designated by intermediate size between largest and smallest openings.

(*g*) System where maximum size allowed indicates the size.

(*h*) System where size is designated by some descriptive term such as Class A concrete, stone chips, base stone, bituminous macadam surface.

(*i*) System where size is designated in terms of limiting sizes; thus, ¼-1.

For example, in the territory served by the New Haven Trap Rock Co., several systems of nomenclature exist with misunderstandings often arising:

3, 2, 1, etc.—City of New Haven.
1, 2, 3, etc.—New York State.
A, B, C, etc.—Connecticut.
Average size—Massachusetts.
Designated by use—Rhode Island.
¼-1—Federal Specification.

Round Versus Square Openings

Much discussion has taken place, and opinion is quite divided on the merits of round or square holes for testing sieves. At the present time there is much confusion because of these dual series.

In the finer screens it is quite necessary to have square mesh openings from ¼-in. down to No. 200 as used for sand. In ordinary quarry operations, square-mesh screens are used for sizing more because of their greater effective screening area.

For these two reasons, it would appear that the adoption of square open-

*TABLE I—COMPARATIVE SIZES OF ROUND AND SQUARE OPENINGS

AGGREGATE SIZE	2½	2	1½	1	¾	½	Average
Gravel		1.75	1.24	.86	.65	.37	
		.87	.83	.86	.87	.74	.83
Limestone	2.10	1.68	1.22	.83	.61	.36	
	.84	.84	.81	.83	.81	.72	.80
Trap		1.83	1.27	.82	.62	.37	
		.91	.85	.82	.83	.74	.83
Slag			1.38	.87	.65	.40	
			.92	.87	.87	.80	.85
Gneiss	2.00	1.64	1.22	.87	.53	.35	
	.80	.82	.81	.87	.84	.70	.80
						Average	.82

*The rule which has usually been used in the making of screen tests, notwithstanding the various shapes of different pieces of stone or types of stone, is as follows: The diameter of the round opening should be 1.21 times the side of the square opening, or the side of the square opening should be 0.83 times the diameter of the round opening. This is arrived at by considering that a screen square opening closely approximates a screen of round openings having a diameter midway between that of the inscribed and circumscribed circles. Taking 0.82 as the average conversion factor obtained as the result of Table I, it is noted that this closely approximates the theoretical factor 0.83. As shown in this computation, the percentage of error would not amount at the most to over a few percent. Evidently angularity is not as important a matter as it would seem. This may be accounted for by the fact that the weight of the flat angular fragments may be no greater than that of the spherical fragments and screen analyses are based on percentages of material by weight passing through or retained on given sizes of openings. Table II is based on the above conversion factor of 0.82.

*Engineering Director and Secretary, New York State Crushed Stone Association.

TABLE II—TABLE OF APPROXIMATELY EQUIVALENT ROUND AND SQUARE OPENING TESTING SCREENS

Square Openings			Round Openings	
Size Designation	Opening Inches		Opening Inches	Approximate Equivalents
No. 4	0.187 x 1.207	=	0.23	¼ in.
¼ in.	0.250		0.32	⅜ in.
⅜ in.	0.375		0.45	½ in.
½ in.	0.500		0.60	⅝ in.
⅝ in.	0.625		0.75	¾ in.
¾ in.	0.750		0.90	⅞ in.
⅞ in.	0.875		1.06	1 in.
1 in.	1.000		1.21	1¼ in.
1⅛ in.	1.125		1.36	1⅜ in.
1¼ in.	1.250		1.51	1½ in.
1½ in.	1.500		1.81	1¾ in.
1⅝ in.	1.625		1.83	1¾ in.
1¾ in.	1.750		2.11	2 in.
1⅞ in.	1.861		2.25	2¼ in.
2 in.	2.000		2.41	2⅜ in.
2⅛ in.	2.070		2.50	2½ in.
2¼ in.	2.250		2.72	2¾ in.
2½ in.	2.500		3.02	3 in.
2⅝ in.	2.625		3.17	3⅛ in.
3 in.	3.000		3.62	3½ in.
3⅛ in.	3.100		3.75	3¾ in.
3½ in.	3.500		4.22	4¼ in.
4 in.	4.000		4.82	4¾ in.

ings for testing sieves would be more satisfactory. However, the decision as to which openings to use for testing is not nearly as important as the adoption of either one or the other.

In the meantime, as both round and square openings are being used both in testing and actual plant operations, it is important to know the relative relation (Table I*). Committee E-1 of the A.S.T.M. on Sieve Analysis of Five Different Kinds of Materials made tests using both round and square openings testing screens. A. T. Goldbeck, in 1932, had this data plotted and connected with curve lines instead of straight lines. The size of the square openings that would retain the same percentage of material as the different sizes of round openings used in the analyses were read off the curve and finally the ratio of these square opening sizes to the round opening sizes was obtained for each sieve and for each material. The results are given in Table I.

Lack of Cooperation

It appears strange to the layman that there should exist such an individualistic attitude among engineers. It is not the point of this article to condemn any engineer or the profession, however, a few examples may clearly point out the typical reactions in daily occurrence:

(1) One well-known engineer of particularly high standing was not only greatly annoyed, but expressed his opinion in no mean terms at the audacity of the writer's suggesting that he might desire to consider a change in certain of his specifications as the result of findings in comprehensive tests by a certain state department, located in this engineer's own city. This engineer stated in the plainest of words that he was running his city affairs and had no interest in the research carried on by other engineers, even to the extent of investigating the recommendations.

(2) A conference of testing engineers of several states was called by a leading state testing engineer, to which producers were invited. After considerable discussion, the engineer calling the meeting threw up his hands and requested, inasmuch as there was no chance of agreement on the sizing of stone among the six engineers present, that the writer take charge of the meeting and see if the producers could come to some agreement regarding standardization among themselves.

Perhaps it would be well here to allow a contractor to ask a typical question:

(3) A contractor wants to know:—How do climatic conditions in Massachusetts differ from those in Rhode Island, so that the trap rock shipped out of Connecticut must be 2¼ in. to 1¼ in. in size to make good roads in Worcester, Mass., while the same type of roads would be a failure in Providence, R. I., where the stone must be 2⅛ in. to 1⅜ in.?

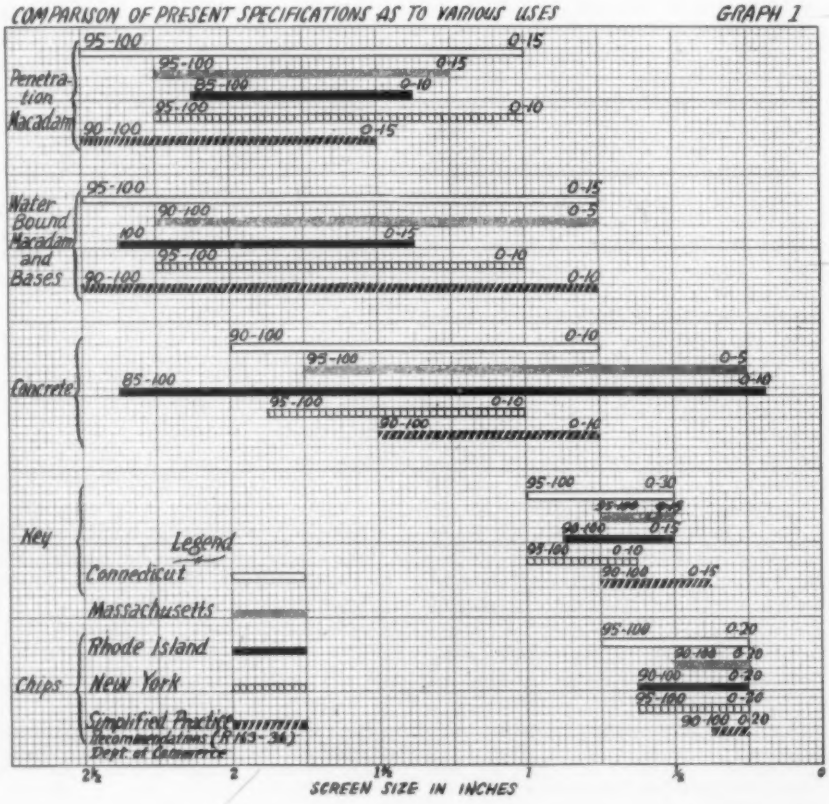
(4) A producer in Connecticut might ask this question: How do you explain the fact that my customer, the A.B.C. Contracting Co. in New York, can obtain maximum density and most workable concrete of stone from 1⅞ in. to 1 in., combined with stone from 1 in. to ¼ in., in a 70-30 combination; and, when he crosses the state line, he can no longer obtain the maximum density and workability of concrete in Connecticut, but must use stone from 2 in. to ¾ in. combined with stone from 1 in. to ½ in., to accomplish the same results in a 70-30 combination, the material in each case coming out of the same quarry?

Numerous Uses Of Stone

Probably the most difficult problem in simplification is the numerous uses for which stone is used. However, when

(Continued on page 41)

COMPARISON OF PRESENT SPECIFICATIONS AS TO VARIOUS USES — GRAPH 1



Preventing Kiln Troubles By Finding Cause

Part 5

By W. S. DICKIE*

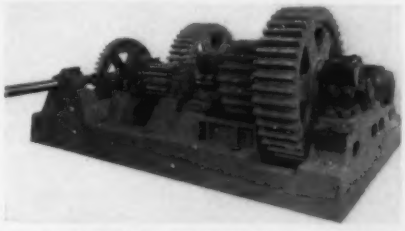
Probably the majority of the troubles experienced in kiln operation can be traced to maladjustment or misalignment of the roller bearings. In some cases the trouble goes back to the installation of the kiln. In others it is the result of lack of supervision in that the bearings were allowed to get out of adjustment. Perhaps the best way to go into these troubles is to start out by giving the proper method of setting up and adjusting bearings on a new kiln.

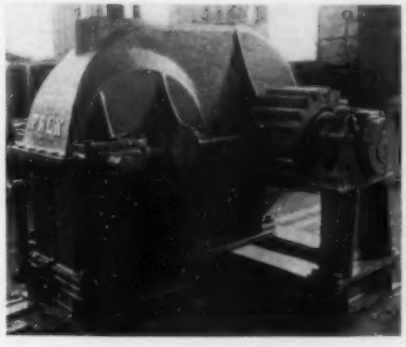
Aligning and Adjusting Roller Bearings

When the bedplates for a new kiln are set up, they should be accurately aligned so that they are both at right angles to the centerline of the kiln and parallel with it. In all cases allowance should be made on the top of the foundation so that the bedplates can be wedged and shimmed to their proper position, after which they should be grouted in place. Usually there is a mark on the bedplate which should be set on the centerline of the kiln. After the bedplate has been properly set, the distance between this centerline mark on the bedplate and the roller bearing shafts should be trammed to assure equal distance of all rollers from the centerline. In the case of the older type of four-roller bearings, the tramming should be done to the shaft in the bottom of the equalizing cradle. On the newer design of two-roller bearings, it should be done to the center of the roller shafts. When these dimensions have all been made the same, then all roller shafts will be exactly parallel with the centerline of the kiln and, of course, though not in adjustment for operation, they are in the proper position for making adjustments.

Adjusting screws should now be turned a very small distance and in the proper direction to "cut" or skew the roller shafts so that they will overcome the gravitational end thrust due to the pitch of the kiln. The amount of movement on each adjusting screw nut should be the same. The kiln should then be revolved a few times and the effect carefully noted. If the kiln shell maintains a position between the two thrust bearing rollers, then the adjustment has been correctly made. On the other hand, if it runs uphill or downhill too much, the adjusting screws should be turned in or out to get the proper adjustment.

As a rule it is impossible to get the final adjustment on all sets of roller bearing supports. Therefore, the final close adjustment should be made on the set of roller bearings on which the thrust bearings are mounted. If a record is kept of the distances between the centerline mark on the bedplate and the centers of the shafts after a final adjustment is made, it is possible by tramming to determine whether or not the kiln is in adjustment at any time. Of course, such things as uneven wear on tires or rollers can throw this measurement out slightly; but if accurate records are kept and notes made as to uneven wear or other things which might influence adjustment, it is possible to know at all times the condition of adjustment of the equipment.





Above: Old style of kiln driving gear. Below: More recent type of driving gear for rotary kilns

Mention was made above of starting out incorrectly in making the foundations for the supporting bearings. In one case the foundations were incorrect, both with respect to their position at right angles to the centerline and parallel to the pitch of the kiln. The bedplates were set on these foundations and grouted to a certain position above the foundation rather than in a relationship with the centerline of the shell. This resulted in excessive wear on the rollers and in making correct adjustment of the supporting bearings practically impossible. The only cure for this trouble is to loosen the bedplates and shim them to their proper position.

Cored Foundations May Be Damaged by Vibration

In several instances known to the writer, foundations for the rotary kiln, which are usually rather high, have been cored out or arched either for the saving thus afforded in concrete or possibly with the idea of making a more symmetrical-looking foundation. In these cases the arches are cored out in places made parallel to the centerline of the kiln, resulting in either two or three columns between the mat and the top slab of the foundations. There is no very great objection to this method of making a foundation provided the columns are of sufficient size so that enough mass is in the foundations to absorb vibrations from the kiln.

It is a generally accepted fact that rotary kilns have inherent vibration. As far as we know, there is no way of eliminating this vibration; therefore, it must be absorbed. Also, there does not seem to be any better way of absorbing it than to use an enormous mass of concrete in the foundations for this purpose.

Vibration which is not absorbed by arched foundations is more or less magnified as the kiln revolves and usually results in backlash between gear ring and main pinion, thus making definite shocks which are likely to cause breakage in the driving gear and give very irregular movement to the revolving of the kiln shell. The danger in using cored out foundations is much greater on the driving gear than on the supporting bearing foundations and, therefore, there is no objection in many cases to the coring out of the foundation on the discharge end supporting bearings when the cooler serving the kiln is carried back under the centerline of the kiln.

Even though the foundations are very accurately set when the kiln is installed and all care has been used in the alignment of the supporting bearings, there is often the possibility of settling in the foundations. When this settling oc-

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curs, it may possibly throw only one end of the foundation out of line or it can be conceived that the entire foundation might move in one direction, thus throwing everything out of line. It is therefore highly advisable, after the kiln has been in operation a short time, that a very accurate check be made on the alignment of the concrete foundations. If settling has occurred, it is usually easily discovered because the supporting rollers naturally go out of alignment and cause the kiln shell to run up or down hill excessively.

Owing to the fact that the foundations are enormous masses of concrete, they are often forgotten in looking for misalignment. This might be caused naturally enough, but it should be the first point to be investigated when misalignment takes place.

Replacing Bushing Causes Maladjustment of Bearings

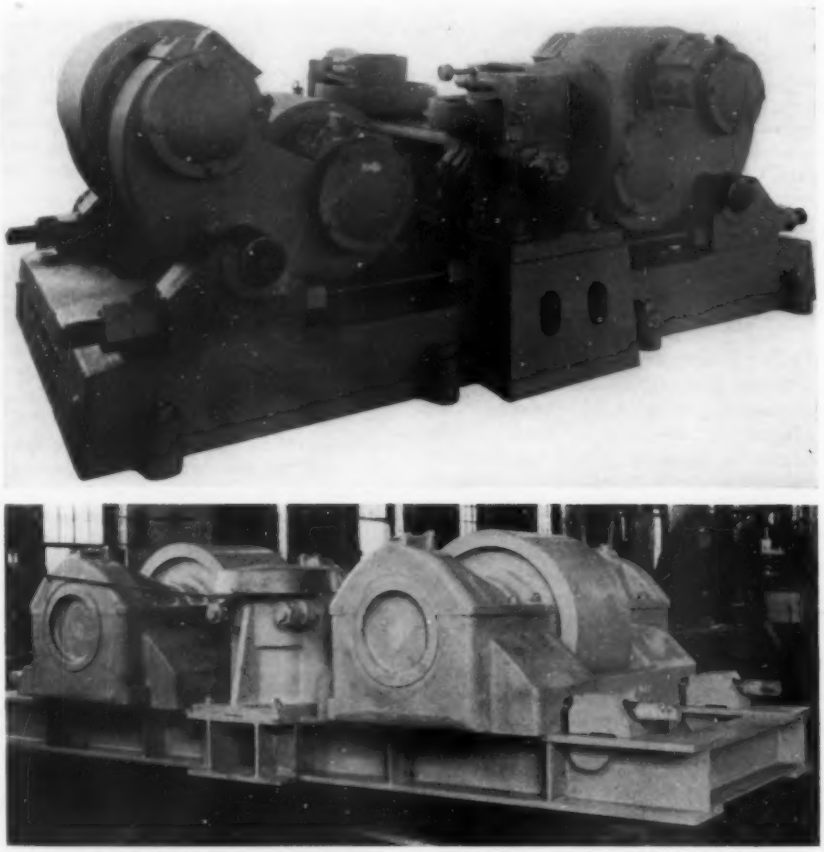
A more or less common cause for maladjustment of bearings occurs when bushings in the roller bearings are replaced. Instances have been found where a bushing wore out on one end of the roller shaft more quickly than on the other and only one of the two bushings in the roller shaft was replaced. This, of course, makes an angle on the roller face and automatically gives that roller a "cutting" action on the tire, making for incorrect adjustment. While it might be thought that bushings should wear equally on both ends of the shaft, there is the possibility that the one on the downhill side would wear faster than the one on the uphill side, although this is more or less theory.

Several cases have been investigated recently where roller shafts have broken. While the cause for the breakage has not yet been determined, it is possible that the trouble may be attributed to replacement of a bushing on only one end of the shaft. There is no possibility that the shear on the shaft imposed by the load of the shell, etc., could break the shaft. Therefore, the cause must be looked for elsewhere. It is highly important that in the replacement of rollers, shafts, or bushings, care should be taken to see that there is no misalignment due to the fact that some parts are replaced and others are not.

In most designs of bearings, the bushings underneath the shafts are shouldered on the inside. This prevents them from sliding in one direction but does not prevent sliding in the other direction. When a condition exists where the sets of roller bearings are incorrectly adjusted in that one set is overadjusted and the other probably under, there is the possibility under certain circumstances that the bushing may slide out of its position, causing wear against some other part of the bearing where there is not intended to be wear. Usually when this happens there is a very marked noise which results in the kilns being stopped for investigation; but sometimes the so-called cure is the machining off of certain parts inside of the bearing rather than a correction of the cause. When this condition is encountered the first thought should be a careful check of the adjustment of the roller bearings and, in most cases, correcting the adjustment overcomes the difficulty.

Evidence of incorrect adjustment of roller bearings makes itself known immediately. Probably the easiest place to note this incorrect adjustment is in the motor. If a kiln is exactly in adjustment, the minimum amount of horsepower for a given speed will be used. The moment the kiln is out of adjustment the horsepower load on the motor increases. This maladjustment also shows itself at times in uneven or jerky revolving of the kiln shell. Another indication of maladjustment of bearings is given when the thrust tire runs constantly against one of the two thrust rollers. This, of course, means that the kiln is running uphill or downhill instead of "floating" between the two rollers. While the maladjustment is indicated by the tire running against one of the thrust rollers, there is also the resultant wear on the roller shaft and bushings in the thrust bearings.

Troubles experienced with thrust bearings are comparatively few and usually can be traced back to some cause outside of the thrust bearing itself, very often in the supporting roller bearings. However, a very serious thing can happen if the adjustment of the supporting bearings is not made so as to relieve the load against the thrust bearing rollers. In one case where a kiln was very badly out of adjustment, partly due to the fact that the kiln was a multiple-tire kiln of comparatively short length and had a badly warped shell, there was an enormous pressure exerted against the lower thrust roller. This pressure eventually became so great that the lower half of the thrust bearing stand, a large piece of the supporting roller bedplate, and part of the concrete foundation were pushed out. Fortunately, the kiln was stopped before it ran completely off the supporting rollers.



Above: Old style of kiln bearings. Below: Modern type of kiln bearings

Safe Quarry Practices Under Difficulties

By CHARLES F. LEWIS*

To bring out better some of the safety practices and equipment, a brief description of the Volunteer Portland Cement Co. quarry near Knoxville, Tenn., may be the best method. It is not an easy one to operate and in many respects is considerably more dangerous than the average quarry. But by planning development well ahead, by adjusting methods to suit conditions and by reasonably good organization and coordination of the work we have operated the quarry for over 10 years with no serious accidents and at low production costs.

The deposit is principally Holston marble, rather soft and most of it quite pure, but whoever put it there was no quarry man, because, after tilting it at about 60 deg. he pushed about 80 ft. of Chicamauga limestone vertically up through it, shattering the whole mass badly and forming a fold which he left filled with large, loose boulders chinked in with gumbo. Over the rest of the area he put deep pockets and troughs in the rock and filled them with red clay. Fig. 1 shows the folded area.

*From an illustrated address before the recent National Safety Congress meeting in Chicago.

Overcoming Hazards In Quarry Operation

Operations are classified under five heads: stripping, drilling and blasting, loading, hauling, and crushing. Each operation has its full complement of individual hazards. Initially the stripping job did not look formidable. Outcrops of rock were frequent and more or less regular, test pits struck rock at shallow depths, and records of test holes drilled in the deposit by marble hunters showed a heavy body of stone. We figured a dragline with a little easy hand cleaning would suffice and we started that way. But it developed that many of the outcrops were loose boulders or the tops of high pinnacles. The dragline could not dig between the pinnacles nor remove the boulders, and hand digging around the loose boulders was expensive and so dangerous it was promptly abandoned.

A river was handy so we started stripping with water but, owing to the deep dirt pockets, we had to develop a special technique, washing comparatively narrow bands along the face down over the wall into shallow sumps from which it is pumped to settling pools. This has resulted in more effective, cheaper and much safer stripping. Fig. 2 shows how rough the surface of the clean rock is, and in Fig. 3 may be seen a typical stripping set up although in much heavier than usual overburden. The hazards of this work are not serious except when the mud line is being erected or taken down on the face.

Primary drilling was started with well drills of non-traction type, to save weight and to make moving safer over rough ground and up rather steep slopes. But drilling was difficult and slow due to the broken character of the formation, and finished holes were frequently found partly filled with clay when we wanted to load them for shooting. Moving drills became increasingly difficult and hazardous. In the folded section of the face we had to build trestles 30 ft. high to move drills back and forth, and lesser ones at other points. Several minor accidents occurred and there were narrow escapes from serious ones.

The loading of well hole shots entailed the laborious carrying of many cases of dynamite up steep paths and over very rough, slippery surfaces by a large, miscellaneous crew of men. Loading interrupted by thunder storms or delayed by bad holes frequently had to be carried far into the night by tired men. Although the utmost care was taken in connecting up shots there were occasional failed holes, difficult to detect after firing because of heavy back break in the face. Much of the yield

Fig. 1: Rock formation at quarry, showing folded strata

Fig. 2: Shows the rough surface of the clean rock in the quarry deposit

Fig. 3: Hydraulic stripping of unusually heavy overburden

was in massive boulders stacked up almost as high as the face, making secondary drilling and loading by shovels quite precarious due to slides. Loading was frequently stopped for hours at a time while men worked with bars and dobie shots to bring down an overhanging mass of rock.

Nature Takes Care of Primary Breakage

Considerations of both operating cost and safety demanded that some better method be devised. After careful study, we decided to assume that nature had taken care of the primary breakage and that our job was to do only secondary, and some tertiary, drilling and blasting. Well drills were therefore discarded, and men were placed on the face with 75-lb. jackhammers wherever they could find room to stand and hold a drill. Wagon drills were out of the question because of the complete absence of defined ledges and the very rough top surface.

Figs. 4 and 5 show how this work is done. It looks dangerous and it would be dangerous for unfitted and untrained men. There, safety depends on good judgment, a cool head, skill and a ¾-in. manilla rope. The ropes are replaced at short intervals but the regular drillers are still the same men we started on this work six years ago. There have been a few accidents, some painful but none serious, most of them resulting from a temporary delusion of the victim that he was so good he didn't need the rope.

The result of this change in method has been an appreciable reduction of the more or less uncontrollable hazards, better preparation of stone and considerably cheaper operation. Instead of loading 10 tons of dynamite dangerously and laboriously, we shoot daily little more powder than we used before for secondary blasting, in lots of from one to four cases, handled by only two thoroughly experienced men. Failed holes are rare and easily spotted. Incidentally, yield has increased from under three tons per pound of powder to over six.

For this wall work, men are selected carefully and watched closely. The rules are few and simple but rigid compliance is demanded. Each man must have a good, individual rope firmly fastened back from the top of the wall and long enough to reach the floor. A rope damaged even slightly must be replaced.

After each shot, the wall from the top down must be thoroughly cleared of loose boulders and spalls before any wall drilling or block hole drilling is again started, and before a shovel moves in. A driller or other worker going to a new station must always go down from the top, with a bar, shovel and pick, testing every boulder and clearing all loose material above the section to be drilled. Frequently this takes several hours. After a rain or a freeze this process must be repeated and walls over working areas are inspected every morning. All men are taken off the wall when it starts raining.

A man stopping anywhere on the wall must tie the rope short and securely to his body before starting to work. This rule, by the way, is the one the foreman has to watch most closely because an old head suffers from the sissy complex when it comes to tying himself to a rope where he feels he is entirely safe.

For blasting we observe all the standard rules for storage of explosives, for opening cases, making primers, etc. As a result of my earlier experience with hand lit fuse casualties, we have always used only electric exploders for our routine blasting; fired from a power line well back from the face and in a shelter. On rare occasions, a cap and fuse are used in a dobie or seam shot to bring down a dangerous boulder too heavy for bars to move, and we occasionally shoot not over three or four holes in this way to clear boulders for the stripping.

For loading, a 2½ cu. yd. electric shovel on crawlers and 10-ton steel, side dump cars are used. The shovel takes current at 2300 volts, which I think is too high. I insisted on 440-volt current at the time the shovel was bought, but we had an electrical engineer during construction who disagreed and put over the higher voltage without my knowledge. We have the utmost respect for the electric cable feeding this shovel. It is made of three heavily insulated power wires and three copper ground wires all enclosed in a thick, live rubber (Dilurium) jacket. The ground wires are solidly grounded on the shovel frame and again at the end of the pole line where there is a disconnect switch. A ground wire, connected to the cable grounds, is carried on the poles back to the edge of the quarry and is grounded at two more points; once by a long rod going down into water in an old test drill hole and again on a long rod driven deep into an old pool just outside the quarry. This latter ground and in fact all our grounds at the plant, have been tested by insurance company inspectors and reported first class. We do not have the shovel itself grounded except to the ground wires in the cable.

The cable is inspected daily for cuts or bruises and all damaged places are carefully repaired. With current on, it is handled only by the shovel helpers who wear protected gloves, tested to withstand 10,000 volts. Other workers are warned to keep away from the cable and they do keep away. We have had no accidents due to electricity.

Quarry Track Laid In Shape of Figure "9"

In opening up the quarry, we necessarily had to use several spur tracks for loading which were expensive and laborious to maintain and move, consuming much time in back switching and entailing hazards of derailment and rock falling off cars beside those incident to so much track work. As soon as there was sufficient floor room and heavy shooting had been abandoned, we put in a circle track parallel to the face but far enough away for the shovel to maneuver so that ordinary shots would not cover the track. This track is kept in fairly good line and surface, permitting higher speeds with safety; moving parts of it out as the face is carried back only four or five times a year. The "figure 9" circle is used because we dump cars at the crusher only on one

side, having put a flash board on the other side to reduce spill inside the circle track.

Hauling is done by a 25-ton gasoline locomotive equipped with air brakes, pushing four cars which average 12 tons of rock each. The crew consists of an engine man and a switchman and no one is allowed to ride the loaded cars. One of our shovel men, who knew better, lost half a finger by ignoring this rule.

At the crusher the track system is simple and largely accident proof. After being dumped at the crusher, empty cars are dropped by gravity into a short siding below the crusher. When four empties are in the siding, the locomotive pushes four loads up past the crusher. Three cars are held with hand brakes and the fourth is spotted at the crusher by the locomotive. When the fourth car is emptied the crusher man releases the third load which comes down to the crusher by gravity, knocking the empty ahead of it. A strict rule requires the crusher man to blow a whistle every time this is done, even if he is sure no one is in position to be hurt. No one has been hurt so far.

We have one practice at the crusher which probably will not be approved by safety experts; that is, permitting the crusher men to go down into the crusher enclosure while it is running, as shown on Fig. 6. There are two reasons why this has to be done. One is that our crusher is a little too small for our shovel dipper, and occasionally there are over-sized pieces which will not enter and, fairly frequently, slabby pieces which bridge over the opening. At times, too, we have considerable clay in individual cars which must be sliced and pushed through the crusher. Various other presumably safer methods were tried, but none were effective. As it is, no one is permitted to go down to the crusher without a safety belt on a strong chain. When the operator is sledging or drilling on oversize rock, the helper holds the chain out of his way. When engaging the hook on a rock wedged in the opening, the operator must do one of two things, either he must hold firmly to the haft of the hook or, after it is firmly engaged in a rock, he must get well back before the pull starts. Otherwise the back lash of the suddenly released hook would be quite dangerous.

Fig. 4: Workman, equipped with safety rope, drilling ledge on quarry face preparatory to blasting. Fig. 5: Shovel loading stone on rail quarry cars. Note workmen drilling on quarry ledge

Accident Prevention Work Is Simple and Informal

Our accident prevention work is conducted rather simply and informally, largely individually, with rather strong emphasis on dangerous human traits and other characteristics of the men with whom we work.

All of our men are white and native born, most of them from families of many generations in America. East Tennessee and adjoining areas produce excellent workmen, intelligent, rather independent and self confident, quite dependable and loyal. Applicants are checked as to their habits, industry and intelligence. We generally pick them young and, having proved them, hold on to them. We have not discharged a man in years and few if any, quit. Many whom we work extra in busy seasons come back again when we can work them. It is our view that this low labor turn over is an important factor in safe operation.

All the ordinary safety rules are observed and guards installed wherever possible. We explain to the men the particular hazards of particular tasks and other hazards to which the task may expose them, emphasizing especially that they are not expected to take chances to save time. We put the responsibility largely on each man, individually. For example, a driller cleaning off the face is his own judge as to when it is safe, and the foreman interferes only when he is not satisfied that the wall is really safe. If a shovel runner thinks there is an unsafe condition on the wall over his shovel, the condition is checked and corrected as needed.

Fig. 6: Safety chain attached to belt on workman loosening wedged rock in crusher

The special rules are few and simple but we enforce them, and we watch closely because the human traits which produce accidents crop out in the old heads, possibly worse than in the beginner.

We have no elaborate safety organization, no first aid teams, although many of our men have been trained in this work. A committee has been defined as a body of men who keep minutes and waste hours. We have no detailed safety committees, no routine rites or ceremonies. Our general safety committee is composed of all foremen and department heads, and it meets monthly for full discussions of plant safety, but the minutes are brief and the hours few. We keep complete records but try to avoid the predicament of the section foreman who wrote the following note to the supervisor: "I'm making out the accident report on Casey's foot which he hit with a spike maul. Now under remarks, do you want mine or Casey's?"

Each member of this committee is a safety inspector for his own and all other departments at all times. First aid supplies are kept available to every man freely at several points, and we insist on their use and the immediate treatment of even slight injuries.

Ferric Oxide In Cement

Developing New "Titrating Mixtures For Determination of Ferric Oxide Content

By A. J. JOHNSON* and J. T. LYNN*

Since Knop[1] recommended the use of diphenylamine as an indicator in the dichromate titration of ferrous oxide, and more particularly since King[2] described the details of a method for the determination of ferric oxide in portland cement, methods essentially King's have been in use for mill control as well as for acceptance tests.[3, 4]

Gibson[5] has criticized King's method and suggested its improvement by the use of a different "titrating mixture." Kolthoff[6] as early as 1929 called attention to the fact that diphenylamine was not an ideal indicator for this titration. Since then other investigators have discovered that the color change of diphenylamine is affected by temperature, acidity and time. Kolthoff and Sarver have made a systematic study of the properties of diphenylamine and diphenyl benzidine,[7] developed diphenylamine sulfonic acid as an oxidation reduction indicator,[8] determined the indicator corrections for the three indicators, and described the conditions of acidity, concentration, etc., for their use.[9] The authors believe that these publications have escaped the notice of many cement chemists and the purpose of this paper is to call attention to the errors that are apt to arise from the use of diphenylamine in the cement testing laboratory and to point out the advantages of diphenylamine sulfonic acid as an indicator in the determination of ferric oxide in portland cement.

Diphenylamine Indicator

Solutions were prepared as described by King[2] except that the dichromate was prepared by dissolving 1.5375 grams of potassium dichromate per liter of water. The titrating mixture thus prepared will hereafter be referred to as "King's titrating mixture." A titrating solution was also prepared according to Gibson's directions.[5] This will be referred to as "Gibson's titrating mixture."

The dichromate solution was standardized against the National Bureau of Standards standard sample No. 27-B (Sibley Iron Ore) as follows: Three 0.2507-gram samples of the dried (105 deg. C.) ore were treated with 20 ml. concentrated hydrochloric acid and digested at 80 deg. C. to 90 deg. C. until solution was complete. Solution was hastened by the addition of stannous chloride solution in sufficient quantity so that when the sample was completely dissolved (except for a little silica) the color was a pale yellow. This solution was diluted to 100 ml. and 10 ml. portions taken for titration. Three portions were taken from each of the three samples prepared as described above. The 10-ml. portions were treated as follows: The 10-ml. portion was transferred to a 250-ml. beaker, 8 ml. concentrated hydrochloric acid added and the solution heated to boiling. The yellow color of ferric chloride was dissipated by the dropwise addition of stannous chloride solution, using one drop in excess. The reduced solution was at once cooled by immersing the beaker in a pan of cold water. As soon as cool, 20 ml. of saturated mercuric chloride solution were added and the solution stirred for a minute. Twenty ml. of "Gibson's titrating mixture" were added, the volume diluted to 100 ml., 5 drops of diphenylamine solution added, and titrated with dichromate.

The average of the nine titrations was taken as the ferric oxide equivalent of the dichromate solution. The results obtained in the standardization of the dichromate are listed in Table I.

Effect of Dilution and Titrating Mixture

To determine the relative merits of "King's titrating mixture" and "Gibson's titrating mixture" a stock solution of ferric chloride was prepared. Twenty-five ml. portions of this were treated with 10 ml. concentrated hydrochloric acid, boiled, reduced with stannous chloride, cooled, treated with 20 ml. mercuric chloride, 20 ml. titrating mixture and then diluted to various volumes with distilled water before titration. The results of these tests are listed in Table II. The same amount, 5 drops, of indicator was used for each titration.

CHEMIST'S CORNER

Problems and practices of the chemists in the industry are discussed on these pages. Contributions and comments are invited. This article on methods of determining ferric oxide in portland cement will appear in two parts, the second to be published in the June issue of ROCK PRODUCTS—*The Editor.*

TABLE NO. I. STANDARDIZATION OF POTASSIUM DICHROMATE SOLUTION

	Ml. $K_2Cr_2O_7$ for Titration		
	Sample No. 1	Sample No. 2	Sample No. 3
Portion No. 1	10.27	10.32	10.40
Portion No. 2	10.27	10.28	10.40
Portion No. 3	10.35	10.30	10.28
Average	10.30	10.30	10.36

Average = 10.32 ml. potassium dichromate solution.

$$Fe_2O_3 \text{ in sample } \frac{(0.2507)\ (0.9756)}{10} = 0.02446 \text{ grams.}$$

$$1 \text{ ml. } K_2Cr_2O_7 \text{ solution } = \frac{0.02446}{10.32} = 0.002370 \text{ gm. } Fe_2O_3.$$

TABLE NO. II. EFFECT OF VOLUME AND TITRATING SOLUTION ON END POINT

Run No.	Ml. $FeCl_3$ Solution Used	Total Volume at start of Titration	Kind of Titrating Mixture Used	Ml. Dichromate Solution Required	Distinctness of End Point
1	25	90	King	5.30	Fair
2	25	90	King	5.61	Fair
3	25	140	King	7.00	Poor
4	25	140	King	7.00	Poor
5	25	240	King	13.00	Very poor
6	25	240	King	12.20	Very poor
7	25	90	Gibson	5.30	Good
8	25	90	Gibson	5.27	Good
9	25	240	Gibson	5.21	Good
10	25	240	Gibson	5.40	Good

*Lehigh Portland Cement Company.

TABLE NO. III. EFFECT OF IRON CONCENTRATION ON END POINT USING DIPHENYLAMINE INDICATOR

Run No.	Ml. Stock $FeCl_3$ Solution taken	Ml. $K_2Cr_2O_7$ Solution Required	Total Volume at Start of Titration	Fe_2O_3 Equivalent of $K_2Cr_2O_7$ gm./ml.
1	2.50	2.81	100 ml.	0.002162
2	2.50	2.67	"	
3	5.00	5.20	"	
4	5.00	5.15	"	0.002292
5	10.00	10.00	"	
6	10.00	10.00	"	0.002370
7	15.00	14.65	"	
8	15.00	14.68	"	0.002425
9	20.00	19.27	"	
10	20.00	19.10	"	
11	20.00	19.33	"	0.002466
12	20.00	19.20	"	
13	25.00	24.20	"	
14	25.00	24.00	"	0.002459
15	35.00	33.20	"	0.002498
16	45.00	42.60	"	0.002504
17	50.00	47.30	"	0.002505
18	73.00	69.03	"	0.002506

From the results of these tests, it was decided to use "Gibson's titrating mixture" for the remainder of the tests on diphenylamine.

Effect of Iron Concentration

A solution of ferric chloride in 3 percent hydrochloric acid was prepared of such strength that 10 ml. of solution required 10 ml. of dichromate for titration. Since the dichromate solution was standardized against an amount of Sibley Iron Ore which required 10.32 ml. potassium dichromate for titration, the ferric oxide content of the ferric chloride solution was calculated from the results of titrating 10 ml. portions. Using the ferric chloride solution as a standard, several samples of varying ferric oxide content were run. The final volume, before titration, was brought to 100 ml. for each test (Run No. 18 required concentration of the 73 ml. sample before reduction). The results are listed in Table No. III. To each sample was added 10 ml. of hydrochloric acid, the solution boiled, reduced with stannous chloride, cooled, 20 ml. mercuric chloride added, 20 ml. Gibson's titrating mixture added, 5 drops indicator added and the volume diluted to 100 ml. before titration.

Discussion of Results with Diphenylamine

Each of the runs made in Table No. III was made by an experienced analyst. Where duplicate runs were made the check results were obtained by a different analyst using the same burette and solutions as the first analyst.

Since the concentration of acids and salts, other than the concentration of ferric chloride, was the same in each run it is felt that the results obtained are a fair picture of what happens in many cement mills and testing laboratories using the above outlined procedure. To present these data in a form more easily compared with the analysis of cement and raw materials, Table No. IV was calculated from Table No. III. In Table No. IV the figures in the right-hand column would represent the error in percent of ferric oxide that would be obtained using a 1-gram sample of material containing the amount of ferric oxide listed in column one.

It is realized that such a titration would be better conducted with a constant volume at the end of the titration.

TABLE NO. IV. ERROR IN FERRIC OXIDE DETERMINATION USING DIPHENYLAMINE INDICATOR

Fe_2O_3 Taken (Centigrams)	Fe_2O_3 Found (Centigrams)	Error (Centigrams)
0.59	0.65	+ 0.06
1.18	1.23	+ 0.05
2.37	2.37	0.00
3.55	3.48	— 0.07
4.74	4.56	— 0.18
5.93	5.71	— 0.22
8.30	7.87	— 0.43
10.67	10.10	— 0.57
11.85	11.21	— 0.64
17.30	16.36	— 0.94

It is also realized that if the titration were conducted very slowly toward the end, better agreement with the truth might be obtained. However, it is felt that the procedure followed more nearly represents the technique that is employed in the majority of cement testing laboratories.

The stipulation in the specifications of the A.S.T.M. and Federal Government[3, 4] that the dichromate solution be standardized with an amount of sample that "will yield a titration approximately equal to that required by the cement sample in question" would eliminate the error. It is believed that most laboratories feel that all cements are nearly enough in the same range to necessitate but one standardization. The construction of a calibration curve would be feasible, but further tests will show that the ferric oxide content of cements may be more conveniently determined by another method.

(*To be concluded in the June issue*)

Bibliography

1 J. Knop, J. Am. Chem. Soc., Vol. 46, p. 263, (1924).

2 Robert R. King, Rock Products, Vol. 32, p. 72, (Sept. 14, 1929).

3 A.S.T.M. Methods of Sampling and Testing Portland Cement C 77-37.

4 Federal Specification SS-C-158.

5 Wallace K. Gibson, Rock Products, Vol. 33, p. 66, (October 25, 1930).

6 I. M. Kolthoff and N. H. Furman, Volumetric Analysis, Vol. II, p. 486, (1929), John Wiley & Sons, New York.

7 I. M. Kolthoff and L. A. Sarver, J. Am. Chem. Soc., Vol. 52, p. 4179, (1930).

8 L. A. Sarver and I. M. Kolthoff, J. Am. Chem. Soc., Vol. 53, p. 2902, (1931).

9 L. A. Sarver and I. M. Kolthoff, J. Am. Chem. Soc., Vol. 53, p. 2906, (1931).

Hardening of Silicate Mortars

V. Rodt mixes normal sand with concentrated sodium silicate solution and forms into a cube in a paper lined mold. On immersing in 20 percent calcium chloride solution for 24 hours a crust is formed by a hydraulic cementing action. The interior of the cube can be removed, leaving a hollow shape which is suitable for observing resistance to water, as well as loss of lime to water leaching. Even after a large part of the lime has been removed, the specimen retains its shape and a considerable part of its strength. If it is desired to carry the cementing action throughout the cube, it is best to let it dry out for a few days, becoming porous so that the calcium chloride solution will penetrate to the interior. These results seem to indicate that the calcium silicate passes through a sol and into a gel stage.

If hot normal sand is shaken for a while with hot lime solution in the ratio of about 5:1 and formed into a cube in a hot, lined mold, in a few days of air storage a surprising strength is obtained. If the lime is first mixed hot with half the water, then ground fine and the other half of the water added, the whole then being well mixed with the sand, a cube molded from this mix has negligible strength. In this case the lime has been taken over into the gel condition, in which it is much less reactive. If the cube of sand and sodium silicate is immersed in ammonium chloride solution, ammonia is evolved and the resulting colloidal silica acts hydraulically on the sand. The sodium chloride is readily removed, leaving a mass corresponding to sandstone. In these cubes the ratio of silicate to sand has been about 1:20, and even when the ratio becomes as small as 1:50 an appreciable hardening takes place. If both solutions are added simultaneously to the sand, no hardening takes place. It was observed that when the cubes are immersed in 20 percent magnesium chloride solution, a similar hardening takes place. These observations seem to point toward the developing of an irreversible colloidal silica inside the mortar into an integral part of the mass. *Tonindustrie Zeitung* (1937) 61, No. 33, p. 371.

Aids to Clinker Grinding

By Use of a Dispersing Agent

By NATHAN C. ROCKWOOD

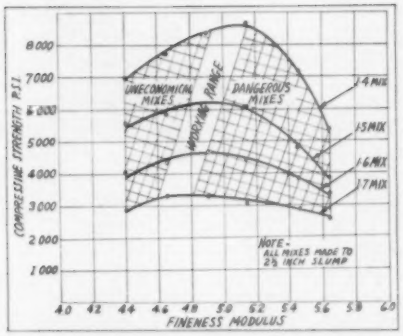


Fig. 1: Example of concrete research at Dewey and Almy Chemical Co. laboratories

No discussion of grinding would be complete without a reference to grinding aids—additions to the material to be ground which facilitate the grinding operation. For example, in the portland cement industry, it has long been known that the addition of very small amounts of coal and various other materials facilitated clinker grinding.

The coal acts as a dispersing or deflocculating agent. In some manner it charges the grinding balls and the cement particles with electricity—the chemical or physical force which makes them attract each other—so that particles are dispersed, or held apart, instead of flocculated or drawn together. However, the use of coal is objectionable since it is an easily detected adulterant in the cement, and may cause a decrease in strength of concrete made from it.

Everyone who has had experience in grinding any mineral very fine has found that the very fine particles tend to ball up or flocculate, which defeats the purpose of fine grinding. The tendency to flocculate can be overcome by circulating the material with air in pipes. For example, we know of an operator grinding a dry clay product to an average of less than 10-micron size, who overcame the tendency of the particles to flocculate by simply keeping the over-size agglomerated particles in a closed circuit with the air separator until they were deflocculated. Probably in this instance the friction of the material built up the electrical charges on them which did the deflocculating. It is probable that part of the benefit derived from an air separator in closed-circuit grinding is because it aids electrolytic dispersion of the particles.

The first to study this phenomenon of grinding with the idea of perfecting it and profiting from the results was the Dewey and Almy Chemical Co., Cambridge, Mass.

This company had had much experience in developing and perfecting pro-

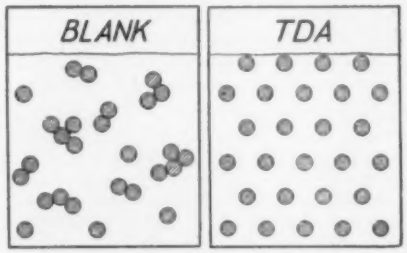


Fig. 2: Above: Start—unhydrated cement particles in water. (Nothing to stop settling.) Below: After one-half hour—particles hydrated. More gel with TDA, hence more interference

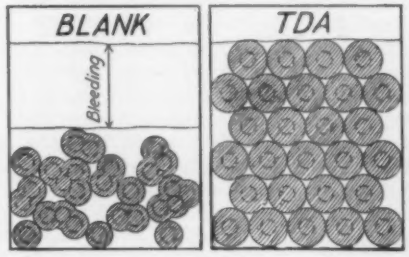
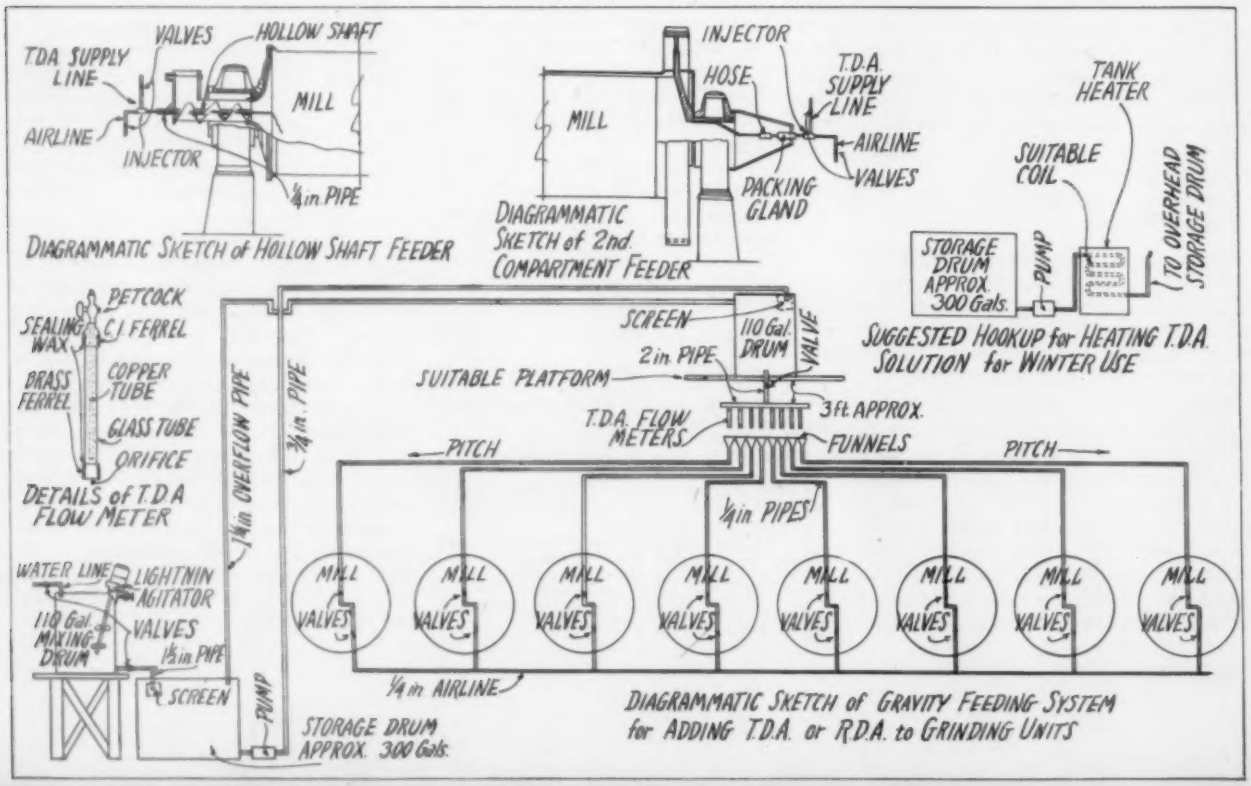


Fig. 3, below: Diagrammatic layout for feeding TDA to a battery of eight clinker-grinding mills



tective colloids, wetting agents and dispersing agents in the dyeing, printing, washing and absorbency of textiles. Moreover, the company is specifically organized to develop by research any chemical or process which offers a profitable market.

After trying a great many products, during an investigation in which 100,000 concrete test cylinders were made, a mixture of triethanolamine salts and highly purified soluable calcium salts of modified lignin sulphonic acid, named TDA was developed. The end sought was not merely a grinding aid, but a dispersing agent that would add to the strength and improve other desirable properties of the concrete made from a cement in which this dispersing agent was used.

Effect on Hardening Cement

H. L. Kennedy, manager of the cement division of the Dewey and Almy Chemical Co., to whose vision and persistence the development of TDA is due, has described the action of this dispersing agent on hydrated cement as follows:

(1) The triethanolamine portion of TDA acts as a catalyst of the hardening reaction. (A catalyst, as chemists of course know, is a substance which, without entering into a compound itself, greatly facilitates a chemical reaction; catalysts have become extremely important in modern chemistry.) In this case the catalyst aids in the formation of the cement gel—the "amorphous constituent" of some authors.

(2) The lignin part of the TDA acts as a dispersing agent, providing more surface area for the cement to react with water.

(3) The effect of catalysis and dispersion is to improve the workability and strength of the concrete, thus increasing the efficiency of the cement; it also tends to reduce "bleeding."

Of course, these facts all had to be established experimentally; and to do this the company invested in one of the most complete cement and concrete testing laboratories in the country. The studies and research made here have been very thorough and the results have been given to the industry from time to time in papers published in the proceedings of the various engineering and technical societies. A recent example is a study of the effect of fineness modulus of combined aggregate on the compressive strengths of concrete. The results of this are indicated in the accompanying chart, which represents only a small fraction of the work involved in this research. An effort is being made to show that for each mix of a given slump, using a particular type and maximum size of aggregate, there is a rather narrow working range in fineness modulus, for the best concrete.

Applying the Process

Having developed the desired product was, however, only half the battle won. Every one knows there is a long step between perfection of a laboratory product and its use in very small percentages in a cement grinding operation. The TDA is sold as dry powder but is used as an aqueous, or water, solution—about one part to 1500 parts of cement for the full effect on strength and workability, and 1 to 3000 for grinding aid only.

To introduce this small amount uniformly into a cement grinding mill required special equipment. This is best illustrated by a diagramatic sketch of a typical installation. By the methods shown TDA can be introduced into the

(Continued on page 41)

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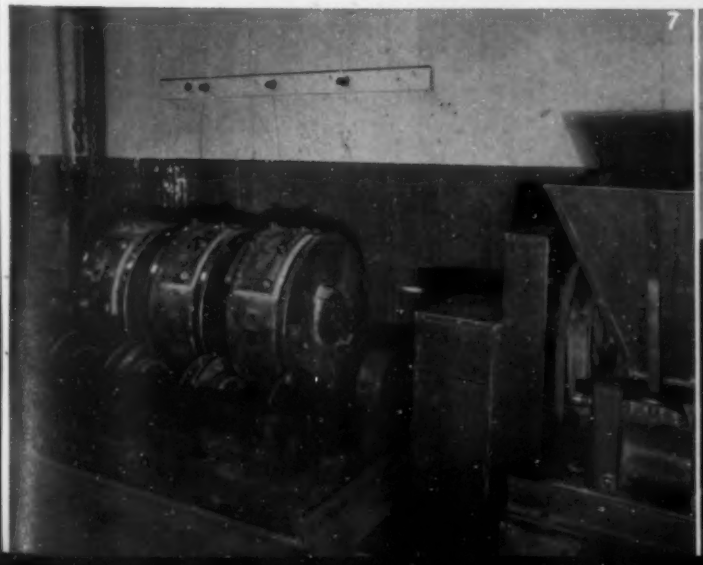
Fig. 5: Part of the storeroom for aggregates—cement containers in center. Fig. 6: General view of the Cambridge, Mass., concrete and cement laboratory of Dewey and Almy Chemical Co. Fig. 7: Unique ball mills for grinding tests—each cylinder a separate unit. Fig. 8: Some standard laboratory testing equipment.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Fundamental Mechanics of Calcination, Hydration

By VICTOR J. AZBE*

The greatest marvel of calcination is that limestone calcined at the mildest temperature for the shortest necessary time, retains as lime the original dimensions of the stone. It has lost 44 percent of the initial weight but all the volume is still there. Although we well know, that the true specific gravity of oxide is 3.4, the apparent gravity of this lime is only 1.46. Half of the volume is free space. The Ca atoms remain as a whole still approximately in their original positions, and the voids created by removal of CO_2 result in a perfectly porous mass. It seems impossible that this delicate structure could be retained without some rearrangement, and natural aggregation, but if there is change it must be inconsequential, for otherwise the original volume would not persist.

This state of porosity is stable only at low temperatures, for when high, the natural tendency is for the individual oxide units to drift together in their natural effort to form the dense crystals of dead-burned lime. This assembling closes up the free spaces.

When the carbonate decomposition reaction conditions prevail for too long a time, particularly if at too high a temperature, there is augmented atomic activity, allowing the atoms to exert their affinity and attract each other over the comparatively wide intervening spaces, thus producing the dense lime which we term "hard-burned."

When lime at its best with an apparent gravity of 1.46 passes through 2 to 2.5 and even 3, and becomes heavy, rings to the hammer, shows shrinkage cracks, assumes an ugly color and slows up in reaction of any sort, it just means that the internal free spaces have been narrowed, and that the lump of lime has come closer to a state of a solid single crystal.

We are so used to thinking of lime and limestone in terms of lumps that we can't force our imaginations to deal with matter atomic in dimensions. There are few other industries, however, where such a concept is more important, since most industries are concerned with the coarsest of aggregates, while the lime man deals with the finest imaginable. All such characteristics as rate of hydration, reactivity, availability, settling rate and plasticity are a matter of manipulation of the ultimate particles while in the process and their consequent degree of dispersion, or in other words clustering or packing.

LIME FORUM

Mr. Azbe is a contributing and consulting Editor of ROCK PRODUCTS. He will be glad to receive inquiries from his readers, and will answer these direct or through the columns of this Forum.

Lime Hydration Is an Internal Reaction

Most chemical processes are surface reactions. Sugar, for example, goes into solution from the outside in; any particle of a combustible material not containing oxygen burns only on the surface, and even the burning of gun powder is a surface ignition and reaction. Such is not the case ordinarily with lime, for during hydration, water may be drawn in with great force and the reaction proceeds along myriads of surfaces. When lime is not structurally impaired its reactivity is tremendous, and so disruptive as to border on the explosive.

But if we impair the lime, which means reduction of the open capillary passages by excess of heat, or closing of some of the entrances or entire sections by recarbonation or with slags caused by the fluxing action of impurities or even by mechanical action such as fine grinding, then the rates of reaction will greatly decrease, because the action will tend to become restricted entirely to the surface.

One would expect that the fine grinding referred to above would speed up reactions and with any substance relying upon surface action, such as combustion of powdered coal, this would be true. With lime, however, grinding may retard reactivity, as those avenues of access to the internal regions become plastered shut by displacement.

Calcium oxide and magnesium oxide at completion of the dissociating process are highly dispersed. It is to our interest, in so far as possible, to retain this state. If we succeed in this, the remaining CO_2 will escape more readily and the core burn out faster; later water will enter and distribute itself very easily, especially during hydration when there is expansion. An original loose and roomy structure will pack far less, forming smaller, less dense clusters, thus tending to confer on the hydrate the many desired characteristics.

Lime of say 1.7 apparent gravity will make different and better hydrate than lime of 2.4 gravity with any hydrate system. While errors in burning are correctable through special hydration methods, this is only partially so. This statement applies particularly when the stone contains quantities of magnesium or when the lime is impure through presence of unusual amounts of silica, iron, alumina and probably other undesirable elements.

To have a finely flocculated and dispersed hydrate means using large quantities of water quickly with initially soft burned lime. Dispersed oxide, that is soft burned lime, will admit into itself large quantities of water if available quickly and permit the escape of steam readily. Although the total amount of heat generated in any given time will be much greater, local overheating may be much less, because cooling water will enter readily with the water of hydration. Slowly hydrating masses give off less heat, but locally they may be quite hot as all of the water that could find access entered into combination with none remaining to cool through evaporation.

Dispersed oxide, which is initially loose and in hydrating expands readily, will draw in large quantities of water and will hydrate rapidly throughout, with the result that there will be less local packing, cooling will be quick and the time for crystal growth will be shorter.

The dissociation point and dissociation rate both depend directly upon the counteracting CO_2 tension. When in equilibrium, no matter what the temperature, conditions will be static. Therefore, no matter how little the temperature and pressure change there will be an immediate dissociation or recarbonation. If the surrounding concentration of CO_2 drops, or if by some means the pressure is lowered, or if in some manner the temperature is raised, there will be an immediate evolution of

* From a paper presented before the American Society for Testing Materials regional meeting at Columbus, Ohio.

CO_2 and formation of lime. If the calcium oxide or magnesium oxide units of the original carbonate crystal cells retain approximately their original position so the CO_2 molecules can fall back into their places readily, the reverse reaction of recarbonation will take place.

Calcium carbonate at atmospheric temperature, surrounded by a gaseous atmosphere containing say 35 percent CO_2, will begin to dissociate at a definite and comparatively low temperature. This must be limited at first to the surface. Within the lump CO_2 concentration will be higher, which will raise the dissociation temperature as well as lower the dissociation rate. Also the internal pressure will be greater, as the escaping CO_2 will create a back pressure due to friction of its flow.

While the surface dissociation temperature will be definitely 1520 deg. F., the value below the surface will be even higher, depending upon several variables. One of these variables is the diffusion of gases; at low rates of CO_2 evolution and when lime has an open structure some of the gases from the surrounding atmosphere such as nitrogen, oxygen, and water vapor may enter and thus reduce the CO_2 concentration therein and so lower the dissociation temperature of 1646 deg. F. which corresponds to 100 percent CO_2 at atmospheric pressure.

If the rate of heat inflow is great due to high temperature differences, velocity will be higher and reverse flow reduced until at a point some distance inward, it may become negligible and the atmosphere may be pure CO_2. Then only will the pressure be the important factor. The pressure will always be more than atmospheric, the excess depending upon rate of flow, distance to the surface or to some convenient crack, natural density of the lime, density created by overburning and shrinking the outer shell, and density or even comparative imperviousness created by the closing of the spaces by the liquid slags of calcium silicates, aluminates, and ferrates.

When there are combinations of these effects unbelievably high pressures of CO_2 trying to escape may prevail. Pressures on the order of hundreds of pounds may develop although one would not have the slightest suspicion of them. These pressures would be generated with such units of space that the overall pressure strength of the cellular structure would be amply strong to withstand any external disruptions, although there may be all sorts of internal explosions and collapses caused by the struggle of the CO_2 to escape. This may be detected from the fact that although the lump of lime was far hotter than necessary to complete calcination and the outer shell showed evidences of overburning, there still may be a core.

The application of this knowledge is of tremendous practical value. Lime commonly may be overburned, but in addition contain core. The mass of the lime is recarbonated, its internal arrangement packed and many passages closed through the loss of the dispersed state and the blocking caused by slags.

Impurities in this process all play an indefinite but always harmful part; the question arises as to whether they are finely or coarsely distributed, single or in combination so that they can with lime form the lower fusing ternary compounds. There is little hope of avoiding simple combinations with lime, but what can be avoided is fusion and the flow of the liquid and subsequent formation of occlusions through the blocking of the channels. These conditions may be prevented through control of temperature, control of time, control of size and control of cross-sectional uniformity of flow of gas upwards and lime downwards.

Apparent gravity of CaO begins to increase immediately after calcination is complete and continues to increase at first rather rapidly, then more slowly. It is also known that the effect of temperature is greater than that of time; that is, it is better to hold limestone longer at a lower calcining temperature than for a shorter time at higher temperatures. Certainly it must not be kept long at high temperatures. If we calcine lime for either one, two or three hours at 1800 deg. F., all three will be soft burned of low apparent gravity, but if we calcine it at 2400 deg. F. for one, two or three hours the tendency in each case will be towards overburning.

The purpose of a cement kiln is to combine the CaO of the limestone with the silica and alumina of the clay. The purpose of the lime kiln, on the other hand, is to obtain CaO free from CO_2, silica and alumina, iron and sulphur, and in addition, obtain it in the porous, spongy, light mass that soft but well burned lime presents.

The limestone will contain, combined with CO_2 a certain amount of CaO, together with some magnesia and variable amounts of several impurities. In lime this CaO will appear as one of the following combinations or conditions:

1. CaO, available, as determined by the sugar method.
2. CaO, undissociated, still combined with $CaCO_3$.
3. CaO, recarbonated by CO_2 back to $CaCO_3$.
4. CaO, dissociated and free but occluded by shrinkage caused by over-burning or sealed off by recarbonated particles or by silicate and other slags.
5. CaO, dissociated but later recombined with the impurities of the lime or sulphur of the fuel, to calcium silicate, aluminate, ferrate or sulphate. These may be divided into loosely combined and strongly combined, the first of which would hydrate in contact with water after a prolonged time.

(To be concluded in June)

Specifying Aggregates

(Continued from page 38)

placed in tabular form, the divergences as to size requirements are not so great. With minor adjustments they may be considerably simplified to the benefit of all.

For example:

A penetrative macadam top stone might be specified at present as 2⅜ in. to 1½ in.

A sewage filter stone might be specified as 2¼ in. to 1⅜ in.

A railroad ballast stone might be specified as 2½ in. to 1¼ in.

A concrete pavement stone might be specified as 2⅛ in. to 1¼ in.*

* This size would be mixed with a smaller size on the job.

There is no outstanding reason why a common specification such as 2¼ in. to 1¼ in. might not be acceptable to all concerned.

Certainly any customer would be better off to know that he was receiving stone from 2¼ to 1¼ in. in each and every successive shipment, than to obtain one size one day and a different size the next.

Differences in Quality of Stone

Unfortunately all sections of the country are not blessed with good, hard stone. Where this is the case, specifications as to quality and sizing will have to vary for economic and practical reasons. This may be adjusted by wider tolerances or an alternate standard specification.

(To be continued)

Aids to Clinker Grinding

(Continued from page 39)

first or any compartment of a mill. It has already been used in the grinding of several million barrels of cement in this country and abroad. It costs about 1½c per bbl. but mill capacity may be increased from 20 to 40 percent, which, of course, means an appreciable saving. The percentage of increase in production is greater in the finer product, so that while about 3c worth of TDA may be required per bbl. of high early strength cement, the proportionate saving at least is as much.

For Raw Materials Also

All the discussion up to this time has had to do with cement clinker grinding, but RDA, designed to act as a dispersing agent only, but otherwise similar to TDA, is just as much of a grinding aid in the case of raw materials as with the finished product. In dry raw grinding and blending its function as a dispersing agent would be doubly valuable.

Accident Experience of the Cement Industry for 1938

An analysis of accidents in reporting member cement plants, covering experience for the year 1938, has just been completed by the Bureau of Accident Prevention and Insurance of the Portland Cement Association.

While the net reduction in accident frequency rate is not large, due to the decline in the total man-hours worked, the reduction in the gross accident total (including all lost time and more severe mishaps) was encouraging. A sizeable decline in accident severity, however, is the most gratifying news contained in the report.

Accident severity has always been disproportionately high in this industry and as it, rather than the frequency of accidents, really gauges their damage and cost to the injured and the employer, a decrease in severity is very welcome.

The high points in the report are as follows:

1. There were 23 percent fewer accidents in 1938 than in 1937—179 compared with 231.

2. There were 18 percent fewer man-hours worked by reporting plants in 1938 than in 1937—about 37 million compared with 44.5 million.

3. Fifty-three, or 45 percent, of the plants operated the calendar year without a single disabling injury. Five of them won the award of the Portland Cement Association safety trophy for the first time; 48 became eligible for reward for from two to 12 perfectly safe years. (See ROCK PRODUCTS, February, p. 84, for listing of plants.) A total of 91 quarries and mines, or 81 percent of the 112 reporting, reported accident-free operation. This compares with no-accident operation reported by 75 percent of the quarries reporting in 1937 and 66 percent in 1936.

4. The accident frequency rate for the industry was about 5.09 accidents per million man-hours of exposure, compared with 5.17 a year ago—a 1.5 percent decline in rate. Only two years have shown a better rate: 1932 with a rate of 4.5, and 1933 when the rate was 4.6.

5. The injury severity rate will be about 2.40 days lost per 1000 days worked, compared with 3.14 a year ago, a 25 percent decline. Only once previously in 26 years has the severity rate been lower—in 1932 it was 1.80.

Experience by Departments

While the quarry departments (which include 10 limestone mines) operated only about 14 percent of total man-hours reported, they contributed 17 percent of the total accidents and fully 52 percent of the time lost on which the injury severity rate is based. Therefore, quarries alone are chargeable with more than 50 percent of the cost of cement plant accidents in 1938. Frequency for quarry in 1938 is compared with 7.47. But the quarry injury severity rate is up two full days lost per 1000 man-hours worked—from 7.40 to 9.40, about halfway between the 1937 rate and the 1936 rate of 11.47. There were 33 accidents reported by 24 quarries. Seven of the 33 accidents were fatal and two were permanent injuries. There was a total of 11 fatalities throughout the industry.

Of the other departments, Packing and Shipping, showed the greatest increase in incidence of injuries. Accidents to Packing and Shipping employes increased from only 8 percent of the 1937 total to 14 percent of the 1938 total accidents, although that department operates only 11 percent of total man-hours. (This was a 175 percent increase.)

The two smallest departments in point of man-hours worked, Shops and Coal Grinding, were objects of concern in 1937 with sharply higher percentages of accidents. Both showed more favorable records at the end of 1938, however, although each had more than its "share" of mishaps. With only 4 percent of the total man-hours reported, Shops reported 6 percent of the total accidents, compared with 10 percent the previous year. Coal Grinding employes work only 2.5 percent of the man-hours, and they sustained 3 percent of the total accidents in 1938, compared with 5 percent in 1937.

With 12 percent of the time worked to its credit, the raw grinding department's percentage of total accidents was eight in both 1937 and 1938, less than its "share", so to speak, but no improvement except in severity. This department's record may be considered more favorable because there was only one fatality, compared with five the previous year. There were four permanent injuries in 1938, compared with three in 1937.

The Burning Department contributed 10 percent of the total accidents while working 10 percent of the total man-hours. This is a reduction from the 14 percent of the total mishaps charged to this department in 1937. Finishing mills worked 7 percent of the man-hours and reported 9 percent of the accidents, 3 percent fewer than in the preceding year.

Analysis of the accident severity problem in the cement industry shows that 90 to 95 percent of the severity charge lies in the incidence of fatal and permanent injuries and that about 86 percent of accident costs result from these types of injury.

The fact that engineering revision, which contributed so much to safety progress in the early years of safety work in our industry, is not receiving comparable emphasis today has been pointed out as one of the likely causes of these very high severity levels. This hypothesis seems to be borne out by the data on the four danger spots in cement plants that contribute most to high injury severity—contact with moving machinery, electrical accidents, falls from high places and railroad accidents. Each of them presents an environmental problem which management could reasonably be expected to solve largely by engineering.

Severity

In 1937, 70 percent of the 58 serious accidents reported are classifiable under the four heads, while in 1938, 82 percent of the 39 serious accidents reported are so classifiable.

In 1937, 15 workmen were killed or permanently injured by contact with moving machinery; 9 in falling from one level to another or being struck by something falling upon them from an upper level; 7 in railroad accidents, and 6 by contact with electrical equipment.

Moving machinery contributed 44 percent of the serious injuries in 1938, compared with only 36 percent the previous year. Falls by men and objects from high places were responsible for 20 percent, compared with 16 percent in 1937. Electricity contributed 10 percent of the total such cases in 1938 as against 9 in 1937, and was responsible for four deaths in 1938 compared with three in 1937. Eight percent of the serious injuries during 1938 occurred in railroad operation, compared with 12 percent the previous year. Only one man was killed in connection with railroad operation last year, compared with three in 1937.

Not a single injury was reported in connection with blasting, a remarkable record and one unequalled in previous years, if ever. A disastrous explosion occurred in a non-member plant in January when an attempt was made to thaw three truckloads of dynamite in a garage. While details are not complete, it is understood that some of the dynamite caught fire and the entire supply exploded while several employes were trying to remove their cars from the garage. Two were killed and one suffered a permanent injury when struck by flying debris.

It is evident from the report that while there is a measure of better control over severe injuries in connection with railroad, the trend of machine and high places accidents is upward and electrical injuries continue severe.

With the establishment late in 1938 of a group of technicians to make a detailed study of industry electrical hazards, the incidence of electrical accidents has already started an abrupt decline. No such accidents whatever have been reported for the first two months of 1939.

Moving Machinery Hazards

Hazards surrounding moving machinery are doubtless the most difficult with which the industry has to cope. In January, 1939, a laborer's right arm was crushed off between the unguarded gears of a cement elevator when the cuff of his glove was caught in them. Lack of guards and unsafe dress or apparel together were just as much causes of the accident as was his unsafe attitude in exposing himself to the hazard. In February, a tunnelman lost a leg at the knee in a screw conveyor when the unsecured wood cover was displaced by flooding cement, allowing him to step into the moving screw.

The Quarry Department's most severe experience since 1929 was characterized by high places accidents in 1938. Four of the seven killed in quarries were struck by or crushed under falling rock at the face. A hard hat would probably have saved the life of one of them, even the loss of time. Better methods of making the face safe and of insuring safer operations would probably have saved the lives of the other three.

Of the four workmen killed in accidents outside the quarry, one fatality occurred in a raw department, one in finishing, one in the power plant and one in the yard.

Finishing headed the list of departments in number of men permanently injured with seven. Burning was next with five, followed by Raw with four, Packing and Shipping and Shops with three each. Two permanent each occurred in Clay Field, on Railroad and in Coal Grinding departments. Only two departments of the 13 used for accident statistical purposes operated during the year without reporting a fatality or a permanent disability.

Accidents by Service and Age Group

Age and experience coincide to a large extent since the majority of new entrants are young people; but irrespective of this, there are certain qualities of youth (bravado, failure to realize danger) which tend to disappear with increasing age. Hence, a proportionately higher incidence of accidents might be expected among the younger personnel, apart from experience in the work.

For the past three years the percent distribution of accidents by service groups of employes in relation to the percent of total employes in each service group in the industry has been kept. In 1936 and 1937, employes having less than six months' service experienced 20 percent and 12.4 percent of the accidents, although only three percent of the total employes in the industry had less than six months' service. In 1938, this group sustained only 4.6 percent of the accidents.

In 1936, employes having from six months' to one year's service contributed 10.8 percent of the total accidents, in 1937 the percentage for this group was cut to five percent, and in 1938 it was further reduced to only 2.9. Employes having less than one year's service, therefore, had 7.5 percent of the 1938 accidents, compared with 25 percent and 23 percent in 1936 and 1937.

This represents five percent of total personnel, and doubtless reflects two things. First, greater emphasis during the past three years on the need for initial safety training of newly employed workmen, and a lower employment level during 1938 with fewer green men hired.

The incidence of injuries to men in the one to five-year service group advanced immoderately to 31.7, compared with 27 and 23 for the two previous years and the incidence for the 10 to 20-year group was up to 35.2 from 31.9 in 1936 and 26 in 1937. The percentages of the 5 to 10-year and 20 years and over groups remained about the same.

Twenty-five percent of the employes in the industry had less than five years' service, and they contributed 39 percent of the accidents.

The Dangerous Age

As for age, preliminary figures indicate that employes from 40 to 50 years of age are most susceptible to accidents. According to the distribution of employes by age in the 11 plants in which dust studies were made and which is our best source of reliable data, about 25 percent of the industry's personnel is in the 40 to 50-year age group. In 1938, 35 percent of all the men injured were in that group. Men under 30 years of age make up 23 percent of total personnel, and in 1938 sustained only 17 percent of the total accidents. Men from 30 to 40 form 30 percent of personnel, and had 24 percent of the accidents. In the 50 to 60-year age group there were 15 percent of the total employes, and they had 20 percent of total accidents. Seven percent of our employes are over 60, and last year they had about three percent of the accidents.

Therefore, it is possible to form something of a picture of the employe to whom special accident prevention effort should be directed.

He is about 45 years old and has had about five years' service. He is in close contact with moving machinery; he is likely to be a laborer, repairman, an electrician, a carpenter or a packer. Ten per cent of the 1938 injuries occurred to workmen classed as laborers and nine percent to repairmen. Two laborers were killed and three permanently injured last year. The other fatalities were pretty well distributed among occupations, except quarry, and repairmen and electricians, who led the rest in number of permanent injuries with three each.

New Information on Silicosis

IN A RECENT ARTICLE, appearing in The *Canadian Medical Association Journal*, the use of fine aluminum dust as a preventive of silicosis was described by J. J. Denny, mill superintendent of the McIntyre-Porcupine Mines, and his associates, Dr. Robson, chief surgeon of the mine, and Mr. Irwin.

It is known that the mere presence of silica in the lungs does not cause the fibrosis of the lungs known as silicosis, but it is believed to be caused by the solution of this silica and its absorption into the lung tissues. Mr. Denny and Dr. Robson, therefore, experimented to find something that would prevent such solution. As silica is most active when freshly fractured because of its molecular structure which presents numerous unsatisfied oxygen atoms to interact with tissue elements, it was thought that if these oxygen atoms could be satisfied, the toxicity of silica in tissue might be diminished and a fibrotic response changed into a simple foreign body reaction. It was finally decided to use aluminum dust for this purpose.

Experiment with Aluminum Dust

Aluminum dust, when it comes in contact with silica particles in the lungs, apparently coats them with gelatinous hydrated alumina. To get aluminum dust into the lungs one may breathe, either occasionally or regularly, air in which a little of it is suspended. This dust should be of a particle size below 5 microns and grease-free, and should be present in the lungs in an amount at least equal to one percent of the siliceous dust. There are no ill-effects from breathing this aluminum dust, and the concentration is not anywhere near the point where it would be explosive. Up to the present, the experimental work has been done successfully with rabbits, but the next step will be to try it out on miners.

Why Diesels Are Used In Rock Products Industry

By RALPH S. TORGERSON

If it were possible to gather together the various operating officials of rock products plants and have a round-table discussion on the question, "What primary sources of power are being used and what units in various capacities are most efficient?" some extremely interesting information would be brought to light.

Undoubtedly a very large part of the discussion would be centered on the Diesel engine, as this unit has become increasingly popular as a source of power for both stationary and mobile purposes. It is used to operate dredge pumps, draglines and shovels, crushing and screening plants, tube mills, locomotives, power-driven barges and tugs, tractors, and trucks, and for other uses too numerous to mention.

The rapid growth in the use of the Diesel has occurred during the past decade. In a sense, it may be said that this form of power grew out of the depression when plant officials were seeking every means of reducing costs to a minimum. Intermittent operation and a relatively high minimum demand charge made the cost of electric power excessive. Operators turned to the use of the Diesel engine as a means of cutting down costs.

It was found, for example, that a Diesel power plant could be had at from $80 to $100 per kw. capacity installed (some figures are lower), depending on the type of engine. On this basis, figuring 10 percent interest and depreciation, the cost will be $12 a year per kw. of plant capacity, which is one dollar a month. This is less than the demand charge on the electric power bill which is generally about $2. Under normal loading of a Diesel plant, 12 kw. hr. can be generated per gallon of fuel which, on the basis of 6c per gallon, would make the cost per kw. hr. about ½c. Lubricating oil costs about half a mill per kw. hr.; labor and repairs, one mill per kw. hr.

Most operating experience indicates that the Diesel engine, even in comparatively small units, develops a hp. hr. on less than 0.40 lb. of fuel. This corresponds to a thermal efficiency of 33.5 percent. The comparative thermal efficiency figures quoted by one authority are 35 percent for Diesel engines, 25 percent for gasoline engines, and 10 percent for steam engines.

Practically every type and size of Diesel engine may be found in operation in the rock products industry. For stationary purposes there are advocates of both the two-cycle and four-cycle engine, air injection and solid injection, but for mobile units, such as tractor and trucks, the four-cycle, solid injection types have become standard with the exception of one large manufacturer who is using the two-cycle Diesel. Considerable space could be devoted to a discussion of the various types and their reported advantages, but it will probably be of more interest to discuss typical examples and operating experience.

Applications of Diesel Power

Diesels are widely used in locomotive, shovel and dragline operation, but very little individual cost data is available. However, a 2 cu. yd. shovel operating in rock would require a Diesel of approximately 150 to 175 hp., and would consume about 5 gal. of fuel oil per hour. A 10-ton locomotive would require about an 80 hp. Diesel engine. In the past year there have been several installations of Diesel-electric locomotives for quarry haulage to crushed stone and cement plants. Typical of these units are the G. E. 20-ton, 150-hp. Diesel-electric locomotives powered with Cummins Diesel, model HB-6 engines now being used by a large cement plant.

Columbia Quarry Co., St. Louis, Mo., now operating six National-Superior Diesel engines, reports that 13.17 kw. hr. were produced per gallon of fuel oil, as an average on five units. Lubricating oil consumption was at the rate of 3070 kw. hr. per gal. These are Diesel-electric units, ranging from 225 hp. to 560 hp., direct-connected to Allis-Chalmers generators. (See Rock Products, October, 1936, p. 38, and January, 1939, p. 59.)

C. C. Beam, Inc., Melvin, Ohio, operates three Diesels. The first two units purchased were a 200-hp. Fairbanks, Morse to drive an 8- x 9-in. air compressor and a 30-in. Worthington primary crusher, and a 100-hp. Fairbanks, Morse to drive a 6- x 6-in. compressor and a 4-ft. Symons cone crusher. Later a 5-cyl., 525-hp. Fairbanks, Morse Diesel-generator unit was added to drive all plant machinery except the crushers. This unit is direct-connected to a 3-phase, 60-cycle Fairbanks, Morse generator rated at 357.6 kw., supplying

Six-wheel, Diesel-powered International truck equipped with 10 cu. yd. body and Wood telescopic hoist hauling iron ore

power at 440 volts. This unit uses 24 gal. of fuel oil per hour.

Gifford-Hill Co., Dallas, Texas, has been operating a 2-cyl., 120-hp. Fairbanks, Morse Diesel direct-connected to a type D, Fairbanks, Morse alternator rated at 90 kv. a., providing current for all plant motors. This plant produces about 50 tons per hour, and uses 65 gal. of fuel oil in a 10-hr. day.

Arkansas River Sand Co., Tulsa, Okla., has been using a 6-cyl. 125-hp. Caterpillar Diesel engine to operate an 8-in. dredge pump. The substitution of Diesel power for electric power, on the basis of 6c per gal. for fuel oil and 2¾c per kw. hr. for electric current, has cut power costs about $225 a month.

Charlottesville Stone Corp. operates four Caterpillar Diesel engines, three of which are 88-hp. units driving a 10-in. Superior-McCully crusher, a 3-ft. Symons cone crusher, and a 12- x 11-in. Ingersoll-Rand air compressor. A 62-hp. unit is direct-connected to a 3-phase G. E. generator rated at 37.5 kv. a., which supplies current for motors operating screens, conveyors, and pumps. The plant has a 400- to 500-ton daily capacity. Fuel oil consumption is about 15 gal. per hour.

Diesel for Tractive or Automotive Uses

A rapidly increasing use is being made of the Diesel engine for trucks and tractors in the rock products field. The industry stands today as having within its ranks the largest single user of Diesel trucks in the United States. This is the Colonial Sand & Stone Co., New York, N. Y., with 260 units. All new trucks are Diesel-powered, and it is eventually planned to convert the remaining gasoline-operated units to Diesel power. Most of the trucks, both old and new, are equipped with 4- and 6-cyl., Cummins Diesels, but some of the newer Mack trucks have the Mack-Lanova Diesel engines. The unique feature about these Diesel-operated trucks is that they are being used for hauls ranging from 6 to 40 miles, a relatively local service, whereas the Diesel-operated truck has generally been considered a long-haul unit for most efficient service. Consolidated Rock Products Co., Los Angeles, Calif., is making a similar use of Diesel-powered trucks. Six Diamond T trucks equipped with Hercules Diesels are hauling from 6 to 7 tons of payload on 4-wheel and 10 tons on 6-wheel trucks. The 4-wheel units with a 6-ton pay load operate on an average at 11 miles to the gallon of fuel oil.

Worden Sand and Gravel Co., Bedford Hills, N. Y., has compiled some interesting operating data on Diesel-powered trucks. Four trucks are equipped with 6-cyl. Cummins Diesels, two Ward-La France end dump trucks, one Sterling, and one Mack. Their performance was compared with gasoline-operated trucks. The Diesel engines were rated at 125 hp. at 1800 r.p.m., with maximum torque at 1000 to 1200 r.p.m. No. 2 Gulf fuel oil was used at a cost of 6c a gallon, plus a 3c state tax, compared to gasoline at 12½c per gal.

Gasoline-engine operated trucks averaged less than 3 miles per gal. as compared with 7 miles per gal. of fuel oil consumed by Diesel-powered trucks. The cost of fuel for the Diesel-operated truck was approximately one-third that of the gasoline operated truck.

The plant is located in hilly country with many 8 to 10 percent grades where the average gasoline-engine equipped trucks must shift to low gear, but the Diesel-powered trucks proceed in high According to the operators of this plant, in hauling a distance of 20 miles, five trips can be made in 9 hours by Diesel-powered trucks as compared to four with gasoline-engine equipped trucks. Diesel trucks cover as much as 300 miles per day, and each truck averages approximately 28,000 miles annually. Trucks are equipped with an overdrive.

Comparative Diesel Costs

After a year's continuous operation of Diesel power in the production of commercial stone and lime, the Gibsonburg Lime Products Co., Gibsonburg, Ohio, has compiled operating data and compared actual costs with those for purchased power. The power plant, new crushing plant and added capacity for burning and handling lime were described in the October, 1937, issue of ROCK PRODUCTS.

The comparison in Table I, below, of Diesel and purchased power costs is based on monthly averages taken over a period of one year from daily records and power bills. During the period covered the plant running capacity factor was 63 percent.

The actual operating cost for Diesel power based on these monthly averages of 28,852 kw.h. or 33,573 bhph was as follows:

Fuel oil (2061 gal. @ $.055)	$113.36
Lubricating oil (21 gal. @ $.46)	9.66
Maintenance (260 hp. @ $.10 per month)	26.00
Taxes and insurance (estimated)	20.00
Attendance labor (estimated)	45.00
Total cost of 23,852 kwh	$214.02
Average cost per kwh	0.0039

Purchased electric power rates for 23,852 kw.h. per month, under the same conditons, at the plant power rate, calculated on the basis of a maximum demand of 212 kw. multiplied by .88 power factor or a 193 kw. billing demand, is as follows:

Capacity charge (193 kw. @ $1.60)	$308.80
Energy charge (19,300 kw.h. @ .014)	270.20
Energy charge (4552 kw.h. @ .012)	54.62
23,852 kw.h. cost	$633.62
Average cost per kw.h.	.0265

The difference between $633.62 and $214.02, or $419.60, is the monthly saving actually realized, or $5035.20 for the first year of operation. Similarly, Diesel and purchased power costs were estimated, based on the producing power for all plant load, as follows:

Unit	KW.H.	Average Demand KW.	Max. Demand KW.
Crusher	13,577	75	112
Generator	10,275	44	100
Purchased Power	17,342	73	100
Total	41,194	192	312

The estimated Diesel power operating cost for 41,194 kw.h. or 61,191 b.h.p.h. (41,194 x 1.5) to produce per month is as follows:

Fuel oil (3841 gal. @ 0.055)	$211.26
Lubricating oil (40 gal. @ .50)	20.00
Maintenance	52.00
Taxes and insurance	40.00
Attendance labor	45.00
Total cost of 41,194 kw.h.	$368.26
Average cost per kw.h.	.0089

The equivalent power (41,194 kw.h.), if purchased, under the same conditions, would be subject to a billing demand of 312 kw. multiplied by .88 p.f. or 283 kw., and would total the following:

Capacity charge (283 kw. @ $1.60)	$452.80
Energy charge (28,300 kw.h. @ .013)	367.90
Energy charge (12,894 kw.h. @ .011)	141.83
41,194 kw.h.	$962.53
Average cost per kw.h.	0.0233

The saving, for all plant load, based on these figures would be $594.27 monthly or $7131.24 for one year of operation.

TABLE I. COMPARISON OF DIESEL AND PURCHASED POWER COSTS

Unit	Hrs. Operated	Average Load B.H.P.	Total Load B.H.P.H.	Equivalent KW.H.	Aver. Demand KW.	Max. Demand KW.
Crusher	182	100	18,200	13,577	75	112
Generator	235	65	15,373	10,275	44	100
Diesel	235	165	33,573	23,852	119	212

HINTS AND HELPS for Superintendents

Safety Collar for Car Mover

By E. E. COOKE,
Vice-Pres. and Gen. Mgr.,
Thomasville Stone and Lime Co.,
Thomasville, Penn.

THERE WILL BE NO MORE SCARS from moving cars at Thomasville Stone & Lime Co., Thomasville, Pa. No longer does the seemingly innocuous car mover leave in its wake a trail of crushed fingers, bruised knuckles and profanity. Hereafter the implement will pinch only the car wheels for which its compound leverage was designed, and not the hands of the user as well.

A very simple safety device does the trick. It is merely a rubber disc, about 8 in. in diameter, with a hole in the center through which the handle of the car mover is forced so that the disc becomes a collar snugly fitting the handle about 12 to 18 in. from its end.

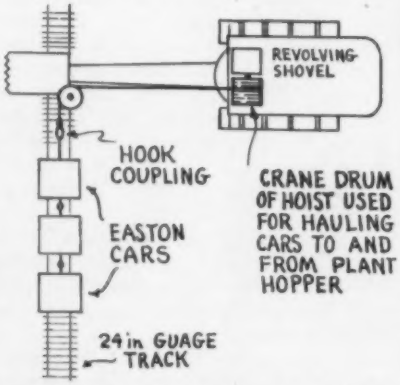
Rubber disc on handle of car mover protects hands of operator

In the illustration, Bob Bentzel, loading foreman at the plant, is demonstrating the use of a car mover equipped with the safety collar. It is obvious that the disc, by checking the downward movement of the handle when still several inches above the rail, gives positive protection to the man's hands. With the collar in place, his hands cannot possibly be crushed between rail and handle, a casualty which was all too frequent prior to the installation of the safety disc. The user of the car mover now handles it with complete confidence, applying as much "umph" as is necessary, without fear of getting hurt. Incidentally, the rubber disc acts as a shock absorber, materially alleviating the jarring effect of the impact.

The device has proved to be highly effective and is now standard equipment at the plant. It was conceived by the author.

Crane Used to Pull Cars

MISSOURI HARDSTONE BRICK CO., Pacific, Mo., sand-lime brick manufacturer, is making use of a crane in an unusual

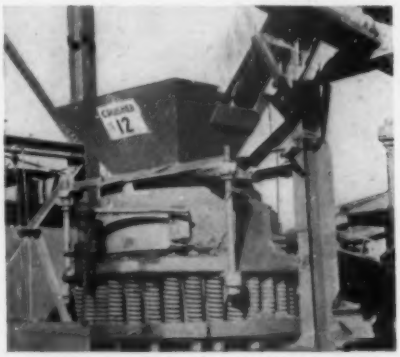

REVOLVING SHOVEL
HOOK COUPLING
EASTON CARS
CRANE DRUM OF HOIST USED FOR HAULING CARS TO AND FROM PLANT HOPPER
24 in. GUAGE TRACK

Showing how crane has been adapted for use as a portable hoist

way. Material is hauled to the plant hopper in Easton cars over 24-in. gage track, using the crane drum as a hoist to pull the cars into position. By using the crane in this manner, a portable hoist is always available and the crane can be put to its customary service whenever desired.

Hopper-Fed Crusher

ACCOMPANYING view shows a Symons cone crusher for screen rejects at the Radum, Calif., plant of the Henry J. Kaiser Co. The placing of a hopper box on top is unusual and appears to have considerable merit. The crusher is fed by a long steep chute, and presumably the hopper is more to prevent the feed

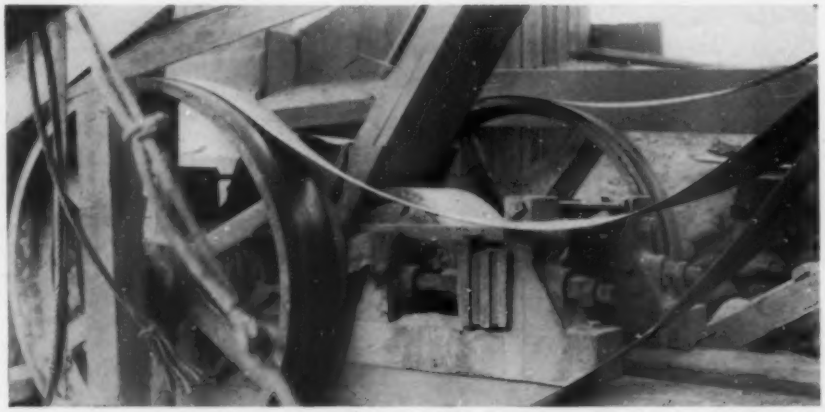


Hopper box mounted on top of cone crusher prevents spillage

from over-shooting the crusher than to regulate the feed. In the case of a smaller crusher it might be more handy for the latter purpose.

Fine Sand from Coarse

A PROBLEM OF production many sand and gravel plant superintendents would like to see solved is making fine sand from coarse sand. Some deposits have fine sand that could be recovered by use of proper equipment, but some just haven't any fines. Various methods have been tried to grind coarser material to 50- and 100-mesh to supply the 10 to 20 percent of these fines called for in many up-to-date specifications. It can



Roll crusher with manganese-steel shells which is used to reduce coarse to fine sand

Above: View of the Cora Ave. plant of the Hawkeye Sand and Gravel Co., Spokane, Wash. Below: L. Schindler, superintendent of the plant

be done in a ball mill, but most operators seem to shy away from the use of ball mills.

Roll crushers have been tried, often unsuccessfully. However, the editors have discovered one plant where rolls are apparently serving this purpose successfully. This is the Cora Ave. plant of the Hawkeye Sand and Gravel Co., Spokane, Wash. The rolls were acquired second-hand; they were made by the Sumner Iron Works, Everett, Wash., over 30 years ago, but have been rebuilt and supplied with manganese-steel shells.

These rolls have a 16-in. face and are 30 in. in diameter. They are belt-driven at normal speed (each of the rolls is separately driven). The setting is 1/16 in. between the roll faces. The coarse sand is dry and is chuted, as shown in one of the views, at a steep angle into the crusher opening. It is said, by the superintendent, L. Schindler, that 8 to 10 cu. yd. per hour can be put through these rolls, the greater part of the product being minus 50-mesh.

The manganese-steel shells were slightly pitted but not scored.

Saves Screen Wear

ONE SAND AND GRAVEL PLANT in the Northwest has long enjoyed a reputation for low cost of production and operating efficiency. It is the plant of the Glacier Gravel Co., Steilacoom, Wash. A visit at the plant with Frank Heffernan, superintendent, convinced the editor that no small part of this reputation is due to careful attention to relatively small details.

As an example, because the plant is rather far removed from sources of machinery and equipment, and repair shops, it was desired to make the equipment serviceable as long as possible. The vibrating scalping screen is a 4- x 8-ft. Stephens-Adamson with a perforated plate having 3-in. octagonal holes. Anticipating the wearing out of the plate, extra plates were purchased at the same time as the screen. These plates have never been used for their intended purpose.

Superintendent Heffernan soon observed that practically all the wear was on the upper third of the plate where the material was fed and the maximum screening was done. So he cut an extra plate into three parts and put one of these thirds over the upper end of the screen, with holes matching, of course. This wearing plate is easily removed and another inserted, and the screen plate proper apparently lasts indefinitely, the greatest wear being on the removable plate.

The same scheme was applied to the conical Gilbert (S.-A.) sizing screens. An extra inside shell is placed in the screen to take the wear and abrasion of the material as fed to the screen. Such a special wearing shell is shown in one of the accompanying views.

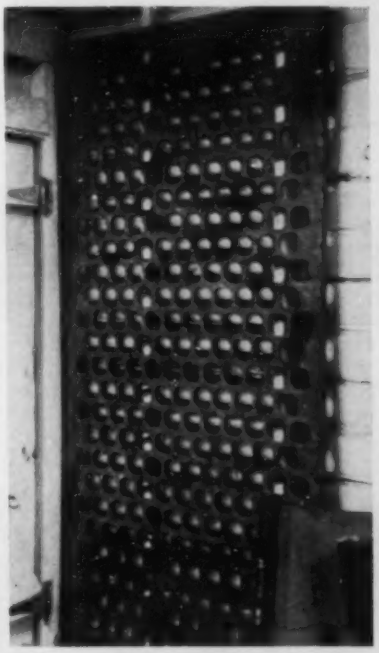
These are only samples of ingenious methods used here to save costs. Another is the provision for taking care of wear on the 4-cu. yd. Bagley scraper bucket, with which all the excavating is done. Instead of the usual teeth this bucket is equipped with special Manten steel lips, made in three parts, so that only the worn part need be replaced in making repairs.

Convenient Method of Handling Sacked Material

CONSOLIDATED ROCK PRODUCTS CO., Los Angeles, Calif., has hit upon a very convenient method of handling cement, lime and plaster in paper bags with hand trucks. All bags are piled on the

Easy to handle sacks by setting bottom bag on edge

hand trucks with the bottom bag on edge, thereby making it easy to set down the load. When each load of bags, usually seven, is piled against the other with the bottom bag on end, it is an easy matter to pick up a load by simply running the nose of the truck under the bottom bag and pulling back on the handles, as illustrated, above.



Left: Perforated plate screen of scalper, the upper third of which is reinforced with a wear plate made from a section of an extra screen. Upper right: Extra inside shell placed in conical screen to take the wear. Below: Scraper bucket which has special steel lips with renewable parts instead of the usual teeth

NEWS about People

CHARLES B. GAGER has succeeded his brother, the late James M. Gager, as president of The Gager Lime Manufacturing Co., Chattanooga, Tenn. Charles Gager is another son of the late Byron Gager, founder of the company. Since its organization in 1892, the leadership of the company has been continuously in the Gager family.

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CHESTER ALAN FULTON, president of the Southern Phosphate Corp., Baltimore, Md., operators of rock phosphate properties in Florida, has been elected a director of the American Institute of Mining Engineers. Mr. Fulton's first job was as assayer for the Standard Smelting Co., Rapid City, S. D. He left this concern after a short time to become shift boss in the cyanide plant of the Peregrina Mining and Milling Co., Guanajuato, Mexico. From 1908 to 1912 he was mine superintendent of the Guanajuato Mining & Milling Co., leaving there for two years of professional work. He was superintendent of Cia. Min. Anon. Lo Increible, in Venezuela, later going to Cuba, where he was manager of the Carlota mine. Mr. Fulton became associated with the Davison Sulphur Co., owning pyrites properties in Cuba, and advanced through various offices until he was made a director of the Davison Chemical Corp., Baltimore, Md., fertilizer producers, and owners of the Southern Phosphate Corp., and Davison Sulphur Co.

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H. A. SAWYER, vice-president of the Lone Star Cement Co., New Orleans, La., was recently appointed to the Board of Directors of the New Orleans Association of Commerce to fill unexpired term of the late Aubrey Bartlett.

ROBERT MITCHELL, vice-president and secretary of the Consolidated Rock Products Co., Los Angeles, Calif., has

Robert Mitchell

been elected president of the company. Since 1935, the office of president has been vacant, the management having been vested in Frank Gautier as vice-president and general manager, and Robert Mitchell as vice-president and secretary. It was stated incorrectly in the April issue of ROCK PRODUCTS that Mr. Gautier was president and general manager. Mr. Gautier is still with the company, but at the present time he is on a leave of absence and is taking a trip around the world with Mrs. Gautier. On his return, he will continue to serve the company in an official capacity.

Mr. Mitchell, the new president, was with the Union Rock Co., Los Angeles, Calif., from April, 1922, the time of its organization, until 1929, when it was taken over by Consolidated Rock Products Co., which constituted a merger of the Union Rock Co., Consumers Rock & Gravel Co., Inc., and Reliance Rock Co., and their subsidiaries.

•

C. J. CURTIN, said to be the dean of the New York natural cement industry, was honored by the Rosendale Society, Rosendale, N. Y., for the part which he had played in advancing the fame of Rosendale, N. Y., as the center of the natural cement industry. He will also be remembered as having been associated with the Farnum Cheshire Lime Co., now part of U. S. Gypsum Co. Wm. N. Beach, son of Rosendale's most famous cement manufacturer and former president of the Lawrenceville Cement Co., was one of the speakers at the banquet, at which many notable figures were attendants.

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CHARLES ROBINSON was recently transferred as superintendent of the Bellevue, Ohio, plant of France Stone Co., to the superintendency of the Monroe, Mich., plant.

•

J. C. WITT has been appointed technical service manager of the Marquette Cement Manufacturing Co., Chicago, Ill. His activities will include the correlation of all the technical work of the company. Mr. Witt is a mechanical engineer, and holds a Ph.D. degree in chemistry and physics. For a number of years he has specialized in the manufacture and use of cements and other materials of construction, having been at various times chemical engineer, plant superintendent, director of research, and consultant. He is a member of the American Society of Mechanical Engineers, the American Institute of Chemical Engineers, and other technical organizations.

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WARREN H. LEONARD, general manager of the Riverside Cement Co., Los Angeles, Calif., was elected a director and

Billboard advertisement of the Consolidated Rock Products Co., Los Angeles, Calif., which is a sample of the aggressive promotional activities of this company

Our friend Joe Shiely of St. Paul, Minn., sends these pictures of the St. Paul Winter Carnival. On the back he wrote: The top is of "the red-whiskered, pick handle Irish" in parade; the bottom shows the J. L. Shiely Co. standard bearers

appointed vice-president and general manager at the company's annual meeting. As a director he fills a vacancy created by the death of Charles T. Rodolph.

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W. Blaisdell Boyd has become office manager of the Rib-Stone Concrete Co., Le Roy, N. Y. He was formerly cashier of the Bank of Le Roy.

•

P. H. Bates, chief, Clay and Silicate Products Division, National Bureau of Standards, Washington, D. C., has been awarded the Turner Gold Medal of the American Concrete Institute. Mr. Bates is now chairman of the Publications Committee and is a past-president of the institute. This honor was bestowed for his contributions to science, and his direction of research and outstanding leadership in advancing the intelligent utilization of cement and concrete.

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Charles H. Makins, president of the Makins Sand & Gravel Co., Oklahoma City, Okla., has been named by Governor Phillips to succeed Rev. James A. Garvey on the Oklahoma Public Welfare Commission.

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S. Waldo Coleman, H. S. Mudd and E. L. Wilhoit were elected directors of the Calaveras Cement Co., San Francisco, Calif., for a period of three years.

Norman J. Huber, former traffic manager and sales representative in Buffalo, N. Y., for the Lehigh Portland Cement Corp., has been appointed sales manager for the Gravel Products Corp.

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L. A. Wagner, chief research chemist, Missouri Portland Cement Co., St. Louis, Mo., has been appointed a member of the St. Louis District Committee, of the American Society for Testing Materials.

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Harry F. Jennings has been elected president and treasurer of the Wabash Portland Cement Co., Detroit, Mich., succeeding the late Emil Stroh. Mr. Jennings entered the employ of the cement company in 1908, and has served in the following capacities: office manager, salesman in southern Indiana territory, and in 1916 he was elected secretary of the corporation. When the Stroh, Ind., plant was modernized in 1917, he was placed in charge of construction, and from 1918 to 1939 Mr. Jennings acted as secretary and sales manager, succeeding to the presidency on March 16.

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T. G. Browne is president and general manager of the Springfield Quarry and Concrete Co., Springfield, Mo., a recently organized concern, now building a crushing and screening plant just west of the city and ready-mixed concrete facilities in Springfield.

Obituaries

William Coyner, who operated a sand and gravel business in Indianapolis before his retirement about fifteen years ago, died March 18 at the age of 78.

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Captain Charles I. King, vice-president and general superintendent of the Portsmouth Sand & Gravel Co., Portsmouth, Ohio, died suddenly March 23 at the age of 60. He came to Portsmouth from Gallipolis, his birthplace, in 1916 and was employed by the Wilson Sand Supply Co. of Huntington to pump sand for the Portsmouth floodwall. The following year, Captain King joined with Floyd Fuller and G. S. Monroe, to form the Portsmouth Sand & Gravel Co.

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O. F. Brinton, in charge of operations at the Snake Butte, Mont., quarry, died March 15. He was 55 years of age.

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Frederick W. Hunt, who is credited with inventing the first machine for making concrete blocks, died at the age of 82. Born in Fond du lac, Wis., he lived in St. Paul for 32 years and for the past 10 years with a daughter in Philadelphia.

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E. C. Switzer, superintendent of the Petoskey Portland Cement Co., Petoskey, Mich., since 1920 when it first started operations, died April 1, at the age of 63. He was born Sept. 14, 1875, in Bath, N. Y.

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Perry P. Quayle, treasurer of the Portage Gravel Co., Cleveland, Ohio, was killed in an automobile accident on April 20. He was 57 years old.

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Phil J. Bliffert, general manager of the Tews Lime & Cement Co., Milwaukee, Wis., died April 21, at the age of 54.

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Albert E. Webster, assistant publicity manager, Universal Atlas Cement Co., died suddenly April 22 at his home in Long Island, N. Y. Although he had been living in New York for the last five months, Mr. Webster was a longtime resident of River Forest, Ill., and was well known in Chicago advertising circles. He was 52 years of age and had been employed in the cement company's publicity bureau for the last 16 years.

•

Michael Mitchell, Sr., for nearly 40 years identified with construction work in New Orleans, La., as head of Mike Mitchell and Sons Construction Co., and as vice-president of the New Orleans Concrete Pipe Co., died March 29. He was 76 years old.

NATIONAL ASSOCIATION ACTIVITIES

Crushed Stone

ADMINISTRATIVE DIRECTOR J. R. BOYD of the National Crushed Stone Association has distributed the report of the executive committee of the association on its application for seasonal exemption under the Fair Labor Standards Act of 1938 so that all may be acquainted with its content. It is anticipated that a public hearing will soon be accorded the industry by the Administrator of the Act. Representatives of the industry will then have an opportunity to submit evidence of the seasonality of their operations.

Aggregates Industries and the Walsh-Healey Act

L. METCALFE WALLING, Administrator of the Walsh-Healey Act, held a panel conference on minimum wages in the aggregates industry in Washington, D. C., on April 12. Mr. Walling explained the Act and the procedure followed by the Department of Labor in determining prevailing minimum wages for industries, and said that consideration was given to the grouping of industries in their determination and the definition to be followed. There was considerable discussion as to the composition of a questionnaire which the industries could use in reporting prevailing wage practices, and it was agreed that the respective national associations should submit to their executive committees, as well as to those members of the panel who are not members of the executive committees, the definition and the questionnaire which the Department recommends, inviting consideration of these two documents and requesting suggestions in the interest of further negotiations with the Department of Labor. The proposed definition reads as follows:

"These industries include all processes necessary to the production and preparation for sale of crushed and broken stone (including rip-rap), sand, gravel, slag, oyster and other shell, top soil, black earth, and cinders. The processes referred to here above are construed to include any quarrying, recovering, crushing, screening, washing, loading, and other activities necessary to the production or preparation of the above-named products."

The invitation for this meeting was sent to representatives of the various aggregates industries, national association secretaries and labor groups, including: sand and gravel, Paul P. Bird, Boston Sand and Gravel Co., Boston, Mass.; David Bonner, Metropolitan Sand and Gravel Corp., New York, N. Y.; R. N. Coolidge, Cumberland River Sand Co., Nashville, Tenn.; F. D. Coppock, American Aggregates Corp., Greenville, Ohio; Alexander Foster, Jr., Warner Co., Philadelphia, Penn.; J. Rutledge Hill, Gifford-Hill & Co., Dallas, Texas; Jos. H. Hogan, The Arundel Corp., Baltimore, Md.; and V. P. Ahearn, National Sand and Gravel Association; crushed stone industry, Otho M. Graves, General Crushed Stone Co., Easton, Penn.; E. J. Krause, Columbia Quarry Co., St. Louis, Mo.; A. L. Worthen, New Haven Trap Rock Co., New Haven, Conn.; Russell Rarey, Marble Cliff Quarries Co., Columbus, Ohio; J. A. Rigg, Acme Limestone Co., Fort Spring, W. Va.; H. E. Rodes, Franklin Limestone Co., Nashville, Tenn.; and J. R. Boyd, National Crushed Stone Association; slag industry, George A. Mattison, Jr., Woodstock Slag Co., Birmingham, Ala.; H. N. Snyder, Buffalo Slag Co., Buffalo, N. Y.; W. E. Bliss, Standard Slag Co., Youngstown, Ohio; and H. J. Love, National Slag Association; riprap stone, Kelly Run Stone Co., Wilkes Barre, Penn.; soil and black earth, Henry Crown, Materials Service Corp., Chicago, Ill.; oyster shell, Walter P. Jahncke, Flint Sand & Gravel Co., New Orleans, La.; and James Marshall, Associated General Contractors.

Coming Conventions

American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 26 to 30.

National Crushed Stone Association, directors' meeting, Westchester County Club, Rye, N. Y., July 20.

National Industrial Sand Association, annual convention, Ambassador Hotel, Atlantic City, N. J., May 24, 25 and 26.

National Lime Association annual convention, Homestead Hotel, Hot Springs, Va., June 1 and 2.

National Safety Congress and Exposition, Atlantic City, N. J., October 16 to 20.

National Sand and Gravel Association, directors' meeting, July 27 and 28, Palace Hotel, San Francisco, Calif.

Industrial Sand

ARRANGEMENTS are now being rapidly completed for the program of the National Industrial Sand Association annual meeting, May 24, 25, and 26 at the Ambassador Hotel, Atlantic City, N. J. On the afternoon of May 24, the board of directors will hold its annual meeting, which will be open to all representing active members. The regular program will start on May 25 and will include the following timely topics: employer-employe relations and national legislation concerning this relationship; trend of state legislation in the occupational disease field; questions of an engineering and research character, covering the use of industry products in certain fields. An opportunity also will be afforded for floor discussions of any question affecting the industry. The third day will be spent at the Seaview Golf and Country Club.

Ready-Mixed Concrete

EXECUTIVE SECRETARY V. P. AHEARN in recent letters addressed to the National Ready Mixed Concrete Association and the National Sand and Gravel Association membership has advised that the boards of directors of the associations had considered the question of prevailing minimum wages under the Walsh-Healey Act, and that letters outlining the policy of the association had been sent to L. Metcalfe Walling, Administrator of the Public Contracts Division, U. S. Department of Labor, charged with administering the Act.

It was the opinion of the boards of directors that it would probably not be necessary to establish substantially more geographical divisions than were provided for in the Code which applied to the industry while the N.R.A. was in

(Continued on page 65)

CONCRETE PRODUCTS AND CEMENT PRODUCTS

Concrete House Exhibit At Home Show

Model concrete house community made by high school students displayed at Kansas City Better Home Show

21 ADVANTAGES of Plain Pallets

BESSER PLAIN PALLET STRIPPERS

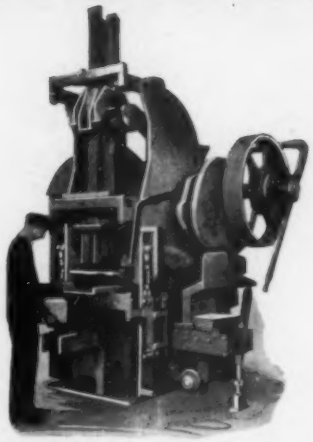
Offer These Advantages to Every Concrete Products Plant

1. **All** Standard Building Units, **Block, Brick or Tile** made on one set of inexpensive Plain Pallets.
2. The **saving in cost of plain pallets** more than pays for your Besser Plain Pallet Stripper.
3. Plain Pallets can be made of **Steel or Wood.**
4. Plain Pallets are **larger than** the **units** made, allowing room at ends for convenient off-bearing.
5. Plain Pallets being larger than blocks allow the **use of roller conveyors** for removing blocks from machine to curing rooms.
6. Plain Pallets save time in plant by **eliminating double handling** of pallets when **changing sizes.**
7. Plain Pallets enable us to equip machine with **Automatic Pallet Feeder** and **complete automatic operation.**
8. **12, 16, 18 and 24" lengths** can be made on the same set of Plain Pallets.
9. Many important plants make **16" lengths, 8" wall** and over, and **18" lengths, 6", 4"** and **3" wall** on one set of Plain Pallets. This saving in pallets in large plants pays for the machine 2 or 3 times.
10. With Plain Pallets you can **change from 1¼" to 1½" or 2¼"** face shell units without any new pallet expense.
11. You can buy a Besser Plain Pallet Stripper without the **fear** of your **pallets** being **made out-of-date.**
12. With Plain Pallets you can **make up specials enough** for the **season,** instead of a couple hundred now and then as is done with cored pallets. It costs too much for full days run of pallets for every kind, corners, sash, double corners, in all wall widths, etc.
13. With the new Plain Pallet Vibrapac, there are still greater advantages with Plain Pallets, by being able to make **3 — 8 x 8 x 16, 6 — 4 x 8 x 16** or 18" lengths or **24 brick,** on one pallet.
14. Making 3 standard 8 x 8 x 16 block on one Plain Pallet, handled with our new Electric Off-Bearing Hoist, has the advantage of reducing the hardest job in the plant to the easiest and yet off-bearer **handles** about **50% more blocks** each day.
15. Plain Pallets with a Vibrator permit you to **make real concrete.** There is no danger of cement, water and fine aggregate bleeding out between your pallets, cores and liners, making pallets unfit for use until cleaned.
16. Plain Pallets are **easily cleaned,** when necessary. Automatic Pallet Feeder keeps pallets clean.
17. **No extra storage space** required as is the case where several sizes of pallets are used.
18. Plain Pallets **do not stick.** This speeds up depalleting.
19. Plain Pallets help retain moisture in block **for better curing.**
20. **No breakage** in steel pallets as in cast iron pallets.
21. Plain Wood Pallets are **lowest in cost** of any pallets and easily obtainable locally.

All These Advantages Apply ONLY to Plain Pallets

Besser Manufacturing Company are owners of all patents ever granted on concrete stripper block machines on which plain pallets can be used. These patents completely cover the basic Plain Pallet Stripper principle. No other firm or individual is licensed or allowed to make machines under any of these patents. Other patents pending.

"The Plain Stripper Pallet is the finest thing ever brought out in this industry. —Dan P. Servey, Kansas City, Mo.



BESSER PLAIN PALLET STRIPPERS

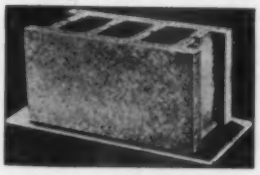
TAMPERS and VIBRATORS

Fully Automatic
Power Operated
Hand Operated

Capacities from 250 to 5000 per day

Write or wire for illustrated catalogue. For specifications and prices state daily production capacity desired and sizes of units you wish to make.

FULLY PRESSED TOP



"Our Business is getting better every day since we are making these better units with FULLY PRESSED TOP on our Besser Plain Pallet Stripper. Masons say they fit like paper on the wall." —Norman Feather, Petoskey, Michigan.

Write or Wire Today

BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

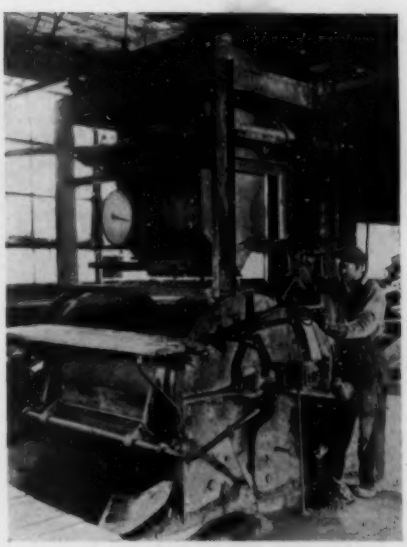
Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL, PORTLAND

205 39TH STREET **ALPENA, MICHIGAN**

EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

Design Concrete Mixes to Fit the Product

By JOHN BEALL



Weigh-batcher operating on overhead rail and 30-cu. ft. Besser mixer

Nation-wide attention has been drawn to the fine job of merchandising concrete houses in Kansas City, Mo., and the prominent part John L. Strandberg and C. Ernest Swanson of Concrete Building Units Co., have played in this development, but very little has been published about the plant facilities which have produced the concrete products.

This company not only believes in concrete products for its customers, but its plant also is of concrete. It is a two-story structure, approximately 40- x 100-ft., situated in the industrial district of Kansas City, and has been designed especially for the most efficient manufacture of concrete units.

Aggregates, consisting of graded sand, ¼-in. and ⅝-in., crushed rock or cinders are received in railroad cars and trucks and dumped into an underground hopper, adjacent to the building, from which they are elevated and stored in individual concrete silo tanks on the roof. Each tank has a capacity of 6340 cu. ft. A rotary screen, installed above one of the silos, is used to screen out the oversize cinders which are chuted to a crusher on the second floor. The product of the crusher is dropped to a cinder bin beneath the first floor level and then conveyed back to the cinder storage tank on the roof. Crushed limestone, free from dust, is supplied by a nearby quarry. Sand is a graded and washed Kaw river product.

Design Concrete Mixes for Each Type of Unit

Suspended from the ceiling of the second floor is a Cleveland tram rail for a traveling weigh-batcher which was designed and built for the Concrete Building Units Co. by the Kansas City Millwright Co. The tram rail is so located that the weigh-batcher may receive aggregates from spouts in the bottom of the storage tanks above. The company engineer has accurately designed concrete mixes to provide concrete units that meet with the strength requirements of the structure in which they are to be used. The weigh-batcher

Storage yard and three-story concrete products plant. All aggregates are placed in the concrete silo storage tanks on the roof to take advantage of gravity in conveying materials

Workmen setting reinforcement in concrete joist form preparatory to vibra ting. Note hoist and monorail for handling joists from plant to curing yard

is an important factor in providing an accurate measurement of the various aggregates drawn from the tanks and the portland cement required. Water also is carefully measured out by weight for each mix.

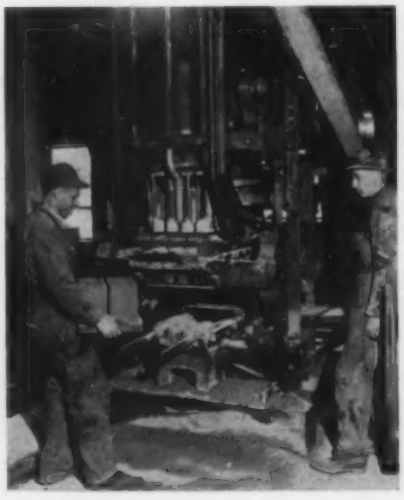
Weighed aggregates are dumped from the batcher in either one of two Besser mixers. Should the order be for blocks, the 30 cu. ft. mixer is used as it is located directly above a feeder hopper over a Besser plain pallet stripper block machine on the first floor. The mixer is operated about 10-min. per batch to assure adequate mixing.

The block machine has a capacity of 2200 standard 8- x 8- x 16-in. blocks per 8½ hr. day. To the side of the block machine is a track on which trucks holding racks of newly made blocks are transported into the four steam curing kilns. These kilns, having a total capacity of 3000 blocks, are heated to 125 deg. F. for 24 hr. After the 24-hr. steam curing period, the blocks are yard-cured for 10 days before shipping. In the event there are rush orders on unstocked items, high, early strength portland cement is used for more rapid curing, permitting faster delivery without sacrificing strength.

In making joists and lintels, the 14-cu. ft. Besser mixer is used. Transportation of the concrete from this mixer is not so convenient as it is located some distance from the lintel and joist vibrator table. It, therefore, must be conveyed by rail-truck to the table, which is on the first floor but in the back of the building due to its length.

Methods Used in Making Joists and Lintels

Generally a richer mixture is used for joists and lintels than for blocks, and these units are also reinforced with rods and stirrups. For example, one run of joists had the following mix: 1330 lb. damp sand, 1945 lb. ⅝-in. crushed stone, and 5.26 sacks of portland high, early strength cement. About 5 gal. of water are used per sack of cement. High, early strength cement is used in making joists and lintels because they are not sent through the curing kilns. This mix gives the following strength: one day, 1100 p.s.i.; two days, 2000 p.s.i.; three days, 2600 p.s.i.; seven days, 3900 p.s.i.; and 28 days, 5200 p.s.i.



Besser stripper block machine which has a capacity of 2200 standard block per 8½-hr.

The vibrator table, built by the American Steel Works, Kansas City, Mo., will accommodate 26-ft. length joists, and each molding batch comprises 20 joists, 4-in. wide. Twelve heavy coil springs set in rubber mountings support the electrically operated vibrator table and dampen out any destructive vibration which might be transmitted to the building.

When the joists and lintels have been sufficiently vibrated, they are placed to one side in the same room until dry enough to remove to the curing and storage yard by means of a hoist operated from a monorail which runs out of the plant across the railroad siding and into the yard. This arrangement permits loading directly into railroad cars for out-of-town shipments or into the yards for further curing.

(Continued on page 57)

Grading Crushed Cinders for Better Products

Fines Are As Important As Sand in Concrete

By BROR NORDBERG

Cinder crushing, if not properly done, will add considerably to the cost of manufacturing concrete products. Cinders are highly abrasive and it is necessary to observe carefully a few simple rules in order to hold costs within reason. Grading of the cinders is also important and is reflected in the quality, or lack of quality, of the concrete units. Fines are just as important as the sand which is used to fill voids in any other concrete.

In some localities cinders are purchased on contract, already crushed, and are supposedly graded. Manufacturers in other sections of the country must crush and handle their own cinders. Many of them use a single, usually roll, crusher and do not even know whether they are getting any fines at all.

Others use a combination of a hammer mill followed by one or two sets of rolls, or use rolls exclusively and are getting a fair product, but there are very few who actually re-screen the crusher products and recombine the fine and coarse particles in desired proportions. It is true that crushers, when properly set and used, have characteristics which will give some of most of the desired gradations.

Unusual Care Taken in Crushing and Screening

Standard Concrete Products Co., Inc., York, Penn., handles its cinders in a manner different than the customary practice. The process involves intermixing in measured amounts two types of cinders, two-stage crushing and recombining a fine with a coarse product.

The cinders, a soft coal product, are obtained locally and are crushed first through 30-in. diameter by 12-in. Kennedy rolls set to reduce the cinders under ¾ in. The crusher is located in a stone crushing plant also operated by the company. Trucks dump into a hopper and a belt feeder, equal to the width of the rolls, feeds uniformly into the opening between the rolls. The feeder arrangement is designed to spread the cinder clinker evenly over the belt to give a uniform ribbon feed into the crusher. This is essential to get an even wear over the crusher faces, and it prolongs the life of the shells. Large clinkers are caught back of a slide over the belt feeder and removed. These are too large to be nipped and would "ride the rolls," causing grooving and premature wearing out. The rolls, driven by a 10-hp. motor through a flat belt drive, have segmented, replacable shells which are corrugated and bolted into place.

Age Cinders by Stockpiling

Discharge from this crusher is placed in a large stockpile where it is permitted to age for several months to reduce organic matter and lime which causes popping in the concrete.

On this stockpile is mixed (by handling with yard equipment) a fine blast furnace cinder, which helps to get the gradation desired and does not require passage through the 30-in. rolls. This cinder, by itself, contains too much fines.

After the ageing period, trucks are used to place the cinders into a hopper in the block plant feeding a bucket elevator. The elevator discharges over a specially-built vibrating screen, where a separation is made at ¼ in. and ½ in. The screen has a split section on a single-deck with a vibrator applied to the frame. Screening surface is a Cross perforated plate of the flanged lip type,

(Continued on page 57)

Left: New Holland corrugated roll crusher reduces cinders to ½-in. minus. Crusher is closed-circuited with a vibrating screen having flanged-lip plate. Right: Partitioned batcher traveling on rails below bins receives desired proportions of ½-¼-in. and ¼-in. minus cinders to exact gradation into a one-bag mixer

To Build Pipe and Tile Factory

THE FEHR CONCRETE PIPE & TILE CO., Eau Claire, Wis., has taken options on several sites at Ladysmith, Wis., with the object of building a concrete products plant to make culverts, sewer pipe, tile and blocks. Fifteen men will be employed. Sand will be obtained from the Wissota pit on the C. D. Swaim farm, and it is expected that the site of the plant will be near the pit.

New Pipe Plants

KENMORE CEMENT PRODUCTS, INC., Kenmore, Wash., has been organized by Clyde U. Taylor, former state representative, to make concrete sewer drainage pipe and culverts.

ELK RIVER CONCRETE PRODUCTS CO., Fergus Falls, Minn., has started up operations making storm sewer pipe for the city. Road culverts and other pipe sizes also will be made.

MID-SOUTH CONCRETE PIPE CO., Memphis, Tenn., has installed steam boiler equipment and is curing concrete pipe with low pressure steam. The plant was described in ROCK PRODUCTS (July, 1938, p. 72). Volume of business in the second year of operation of the company was practically three times that of the first year.

CHOCTAW CONCRETE PIPE CO., Baton Rouge, La., is erecting a $40,000 concrete pipe factory, according to a statement by George McDearmon, manager. Large pipe up to 36-in. in diameter and farm drain tile will be manufactured in this plant. A packer-head type of machine with a capacity of two farm drain tile per minute will be used for the smaller sizes.

ANDERSON DUNHAM CONCRETE CO., INC., Baton Rouge, La., will construct a $30,000 concrete pipe plant on Chickasaw road.

Planning Concrete Products Plant in Michigan

IRVING R. JOHNS, Negaunee, Mich., contractor, is planning to establish a concrete products plant in this city. The Negaunee Lions Club is back of this project and have petitioned the council and mayor for their approval and assistance.

Another Block Plant for Minnesota

EDWARD LARSON, HOWARD SKYBERG, and LAWRENCE BACKMAN are owners of a new concrete block factory which has been started in Malung township near Malung, Minn. The building which will house the plant is 40- x 80-ft. in plan and half of the structure is two stories high.

More Diesels for Ready-Mixed Concrete Service

COLONIAL SAND AND STONE CO. and Transit Mixed Concrete Co., New York, N. Y., have placed orders for 45 Mack Diesel-powered transit mixed trucks costing $500,000.

Concrete Block Enterprise

TEXCRETE PRODUCTS CO., Huntington, W. Va., has been organized by George W. Saunders, well-known Huntington contractor, to make concrete blocks. A two-year lease has been taken on the former Columbia Baking and Bottling Co. building. Initial output will be 1000 blocks per day. Block will be made in any one of 30 shades, according to the report.

Correction

E. W. DIENHART of the Portland Cement Association, Chicago, Ill., was incorrectly referred to as E. W. Dienhart, Jr., in the reports of the National Concrete Masonry Association appearing in the March issue of ROCK PRODUCTS. This error occurred as his son, E. W. Dienhart, Jr., also was registered.

COMMERCIAL PALLETS

NEW DESIGNS

Strength and rigidity increased.

Close fit for new vibrating machines.

Will not break, crack or warp, yet light in weight.

EASY TO HANDLE

Core holes permit free air circulation. Cheaper than plain pallets.

Purchasers of new machines should not be misled about pallet equipment.

Talk this over with your machine maker.

Ask for Prices

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

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DOUBLE STRIPPER

Double Stripper. Lever press. 500-1000 blocks per day.

6 FEATURE ADVANTAGES

Low initial cost and low cost operation.

Makes quality products.

Produces blocks from a wet mix.

Makes a waterproof block.

Masons prefer blocks made on Multiplex machines as every side is finished and true to size.

Adjustable for all sizes of random ashlar work, as well as other sizes and style units.

The Multiplex Double Stripper requires no motive power. Will produce 500 to 1,000 quality units per day. Thousands of plants have built up a good reputation and sound business with these strippers. Ask for details of the complete Multiplex line. The name MULTIPLEX safeguards your reputation and profits.

Multiplex Concrete Mach. Co. ELMORE OHIO

Cinder Crushing

(Continued from page 55)

12 gauge, with ⅛-, ¼-in. and ⅜- ½-in. openings to produce a ¼- ½-in. finished product and a ¼-in. minus size. Blinding of the screening surface is eliminated by using this type of screen openings.

The two screen products are stored in bins of 25-ton capacity each, and plus ½-in. cinders are crushed through 16-in. New Holland corrugated rolls. Discharge from the rolls is put back over the screen by the same elevator.

Measuring Box On Monorail

A measuring box on a monorail traveling below the bins and over the concrete mixer is used to measure by volume the charge of cinder. The box has the exact capacity for charging a 13-cu. ft. Stearns mixer (one-bag mix) and is partitioned to hold half ¼-in. minus cinders and half ¼- to ½-in. cinders. This method insures a fairly close gradation from ½-in. size down and is a positive check on the presence of needed fines.

Capacity of the plant is 60-cu. yd. of crushed cinders per hour. Life of the screening surface, of manganese steel, is estimated at slightly over one year. The roll shells have a life of about 5000 cu. yd. of material before they are replaced.

Design Concrete Mixes to Fit the Product

(Continued from page 54)

"See an architect for better results" is the slogan used on all promotional material prepared by the company. However, in connection with very small homes where the prospective owner cannot afford an architectural fee of even the smallest amount, the Concrete Building Units Co. will furnish a plan, but all clients are referred to architects.

Newspaper space is employed quite frequently in the real estate and builders display section of the Sunday editions. Mr. Strandberg, one of the partners, is teaching concrete house construction to a class in one of the Kansas City high schools. At the "Better Homes" show, his booth exhibited a complete model, all-concrete community plan executed by his class. Motion pictures are being taken of the completion of such a model community from the time the concrete building units are manufactured until the houses have been completed. This film will be exhibited in every high school in the city.

An illustration of the Concrete Building Units booth at the Kansas City Better Homes Show appears on the Concrete Products section cover, page 51.

Concrete Products Manufacturer Adds New Equipment

Twenty-two years ago J. M. Josten established a concrete products plant in Sioux Falls, S. D., an area in which natural building stone was plentiful and cheap. He started with the old Kramer machine, then adopted an Anchor power stripper and later installed a Stearns double-bar tamper attachment. Always making as good a product as the equipment of the time was capable of producing, Mr. Josten strove constantly to improve quality. A year ago he added a Stearns Joltcrete machine, the first west of the Mississippi.

Sand and gravel is trucked from the Josten pit three miles from the plant, elevated to an overhead bin by Link-Belt bucket elevator, discharged to storage through a rotary screen, and then fed to a measuring device which charges an 18-cu. ft. Stearns mixer. Mixed concrete is fed to the Stearns Joltcrete machine which is automatic in its operation. The machine, capable of making nine blocks per minute, actually averages seven blocks per minute in this plant where two men do all the work of handling mixer, and disposing of manufactured product in kiln and in yard. Daily output under these conditions runs about 2000 blocks, a fine average per man.

The plant equipment also includes: a Stearns rock-face stripper, a Hobbs face-down machine, each with suspended tamper; and a Multiplex chimney block machine. A very complete line of concrete garden furniture is also made. Chase cars are used to take green products to curing rooms. Radio spot announcements, newspaper advertisements and pamphlets are used generously to keep the public apprised of the quality of Josten products.

Building Activity in Ready-Mixed Concrete

READY MIX CONCRETE CO., Bloomington, Ind., has recently built a new plant, according to Clark Colbert, manager. The building houses a 30-ton storage bin and a 300-bbl. cement bin, and all operations are electrically controlled. Aggregates are readily available as the plant is built adjacent to the Bloomington Crushed Stone Co.

NATIONAL LIME AND STONE CO., Bluffton, Ohio, has completed a new ready-mixed concrete plant near its quarry.

RICHARD SCULLY, concrete block manufacturer of Coatesville, Penn., is planning to go into the ready-mixed concrete business on May 1. Equipment will include a Jaeger mixer on an Autocar chassis and a Blaw-Knox weigh batcher.

ED HADEN, INC., Houston, Texas, has built a new ready-mixed concrete plant and building material yard. This recently organized company, in addition to ready-mixed concrete, has facilities to furnish mortar, sand, gravel, shell, lime, and other building materials.

Produce 2000 block per man on new Stearns Joltcrete machine at plant of J. M. Josten, Sioux Falls, S. Dak.

Batching plant of the Ready Mixed Concrete Co., subsidiary of the Utah Sand and Gravel Co., Salt Lake City, Utah. To the right is the building housing the batchers with materials received by truck and dumped into aggregate bins on the roof. Concrete batcher is to the left.

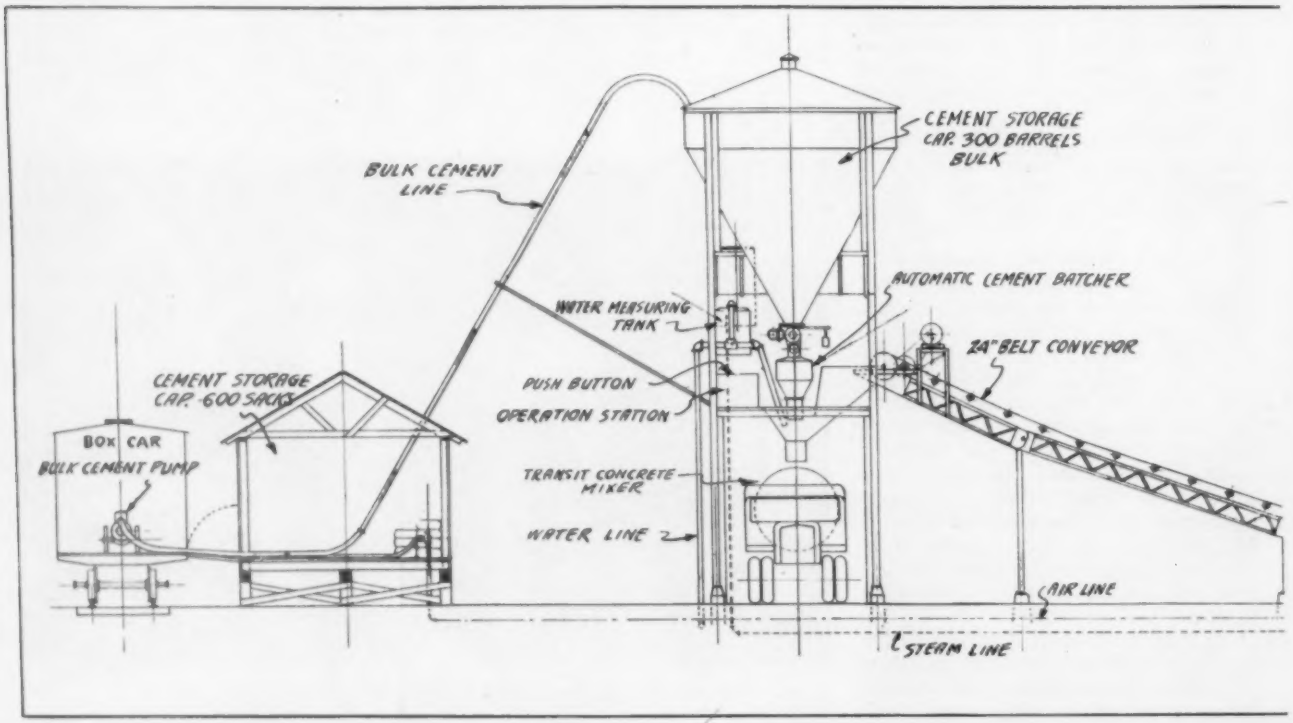
Proportion Scientifically —Big or Little

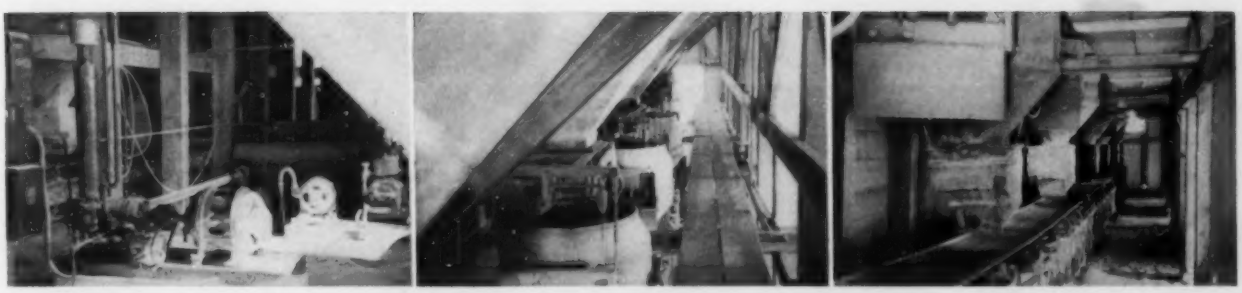
By NATHAN C. ROCKWOOD

Ready-mixed concrete has been introduced in Salt Lake City, Utah, within the last two years by Ready-Mixed Concrete Co., a subsidiary of the Utah Sand and Gravel Products Corp. The chief inducement for the company to go into the ready-mixed business was the opportunity to buy, at a bargain, one of the batching plants used to construct the Bay Bridge between San Francisco and Oakland, Calif. That plant was moved to Salt Lake City and reërected on the company's sand and gravel plant property at a fraction of its original cost. About the same time the federal government asked for bids on 25,000 cu. yd. of ready-mixed concrete for paving the runways and aprons of the Salt Lake Airport.

Use Cement Pump To Unload Cars

Cement is unloaded from railway cars by a Fuller-Kinyon pump, while aggregates are dumped from trucks into the tops of side-hill bins, six in all. Two sizes of sand and three of gravel are used. Proportioning is done by Johnson weigh batchers, which after proper setting are entirely controlled electrically from the operator's tower over the truck-mixer loading hopper. The weighed batches of aggregate are discharged to a 24-in. belt conveyor and delivered to the truck-loading hopper,





Left: Fuller rotary air compressor, to the left, and Curtis air compressor, to the right. Center: Battery of automatic weigh batchers for aggregates. Right: Chutes below batchers feeding conveyor which moves aggregates to concrete batching plant

where weighed amounts of cement and water are added and the charge delivered to four Jaeger 4½ cu. yd. truck mixers on Mack truck chassis. The operations of various pieces of equipment are electrically interlocked to prevent any mistakes in proportioning. A single operator sets the scales in the bin house, and then from his tower charges the truck mixers. The cement bin has a capacity of one car load.

Compressed air for the cement pump and for operating the batcher gates is furnished by a Fuller rotary compressor and a Curtis twin-cylinder compressor.

Brightly Painted Trucks Attract Attention

The mixer trucks are painted a bright orange color and are quite conspicuous. They are kept as bright and shiny-looking as new, by giving them first, before use, a coat of light parafine oil. This protects the body color from the wet concrete, which is regularly washed off. The result is that the trucks look as fresh as the day they were bought.

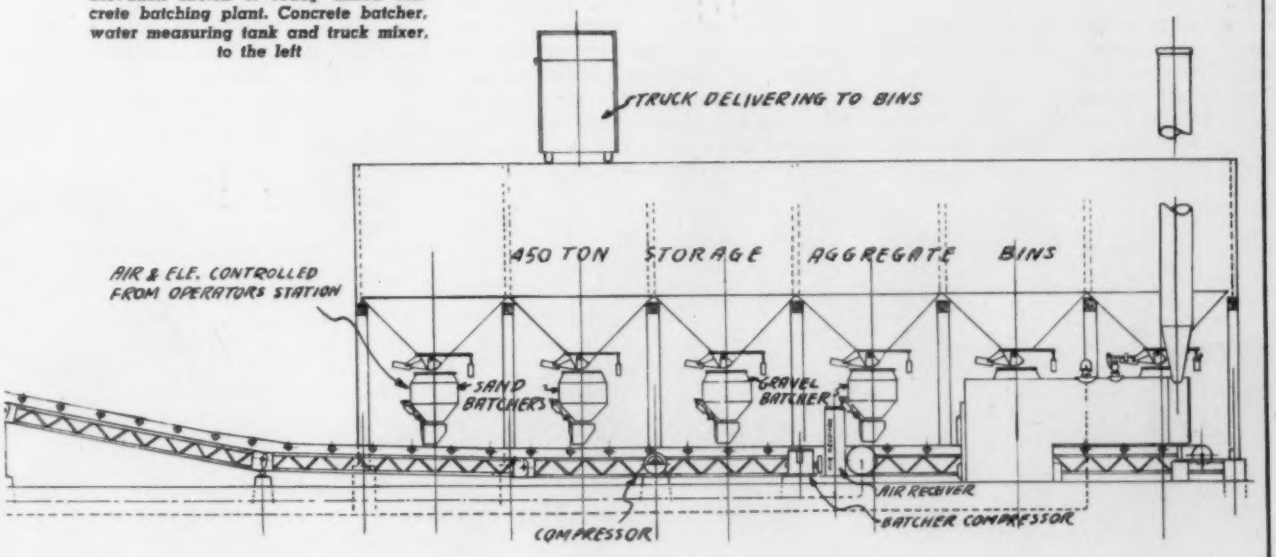
Seventeen Reasons for Using Ready-Mixed Concrete

In the way of promotion the company puts out irregular bulletins on concrete mix designs, etc. One of these bulletins summarizes the company's selling arguments as follows:

(1) It is guaranteed.
(2) You order when wanted.
(3) You receive it when wanted.
(4) Made to specification.
(5) In any quantity wanted.
(6) No excessive clean ups.
(7) No mixer to rent, or store when idle.
(8) No waste or loss of materials.
(9) No unsightly surplus materials on site.
(10) Ready-Mixed is ready to pour.
(11) Its quality and uniformity assured.
(12) At a known cost before construction starts.
(13) More jobs can be operated without extra equipment.
(14) Ready-Mixed lifts the burden from your shoulders, avoids delay in your work and relieves you of all uncertainty as to costs.
(15) Ready-Mixed concrete is heated for winter delivery — saves expenses and trouble of heating aggregates.
(16) Eliminates large labor mixing crews at job site.
(17) Eliminates Social Security Tax, Compensation Tax and miscellaneous labor records and accounting.

The president of the Utah Sand and Gravel Products Corp. is Eric W. Ryberg, who is also a partner of Ryberg Brothers, leading contractors in Salt Lake City. That he readily sells ready-mixed concrete to competitive contractors is ample proof both of the quality of his product and the integrity of his business conduct.

Elevation sketch of ready mixed concrete batching plant. Concrete batcher, water measuring tank and truck mixer, to the left



Less Investment in Stock With Steam Curing

Make Both Concrete and Sand-Lime Units

By BROR NORDBERG

High pressure steam curing of concrete products is being used in several plants in the country, but up to the present only by those concerns which already have the needed manufacturing facilities by virtue of being in the sand-lime brick business.

Detroit has two such plants, one operated by Block and Brick, Inc., the other by Michigan Pressed Brick Co. Operating methods are very similar in both plants and for that matter in others making high-pressure cured concrete units. For this reason, the discussion will be confined to the former company which introduced the "preshrunk" unit to Detroit.

Block and Brick, Inc., was organized two years ago to take over the plant operated by the former Sand-Lime Products Co. near Belle Isle in Detroit. The only product made at that time was sand-lime brick. This was followed by the installation of equipment for the production of sand-lime block. In March, 1938, additional equipment was installed for the manufacture of cinder block, later followed with gravel concrete units.

Present 24 hr. capacity is 90,000 sand-lime brick, based on curing capacity, and 4500 of the 8- x 8- x 16-in. block, or equivalent thereof. The two Jackson and Church sand-lime brick presses each manufacture 30,000 sand-lime, brick in an 8-hr. production schedule.

With the addition of concrete block and concrete brick, the company now has a highly diversified line and has adapted its plant accordingly. Some of the equipment necessarily is assigned to double duty, and bins and conveyors are so arranged that the switch from products in sand and lime to those of concrete is readily made.

The sand-lime brick arrangement consists of two bins, one of 50-ton capacity for hydrated lime and a 60-cu. yd. bin for sand; a rod mill for mixing and crushing of the materials; the brick presses and high-pressure steam curing kilns. Both bins are elevated to feed materials into the rod mill by gravity. Sand and lime from their respective bins are proportioned over belt conveyor feeders where the depth of material being carried can be varied when needed in changing or correcting the proportioning.

Manufacture Concrete and Sand-Lime Products Separately

The rod mill is a continuous mixer and pulverizer, discharging into the boot of an elevator which transfers the mix to belt conveyors that fill the brick press feed bins. This arrangement is available for handling and mixing materials in the manufacture of sand-lime block, cinder concrete block, and gravel concrete block as well, except for the manner of distribution of materials.

General view of plant which produces sand-lime brick and block and concrete block, using either sand and gravel or cinder aggregate. On the left is covered yard storage

Concrete and sand-lime products are manufactured separately in order to utilize the rod mills and the same bins for both types of units. The identical mix of sand and hydrated lime is used for sand-lime brick and sand-lime block, and the rod mill discharge coming from the elevator head is split, part going over a belt conveyor to the brick presses and the remaining fraction being conveyed into a bin over a Besser block machine. This machine is an automatic stripper having a capacity of six and one-half 8- x 8- x 16-in., or equivalent units, per minute.

This machine is also used to manufacture a portion of the gravel concrete and cinder concrete blocks. In manufacturing gravel block, bank run gravel containing the desired percentage of sand is elevated into the 60-cu. yd. sand bin after a run of sand-lime brick or block has been completed and the bin has been emptied. Similarly, in manufacturing cinder block, cinders are placed in the same bin.

Add Hydrated Lime To Concrete

About 8 lb. of hydrated lime is added for each bag of cement used, to fatten the mix and make a more workable concrete. It is claimed that the addition of hydrated lime enhances the waterproofing qualities of the concrete when cured by high-pressure steam.

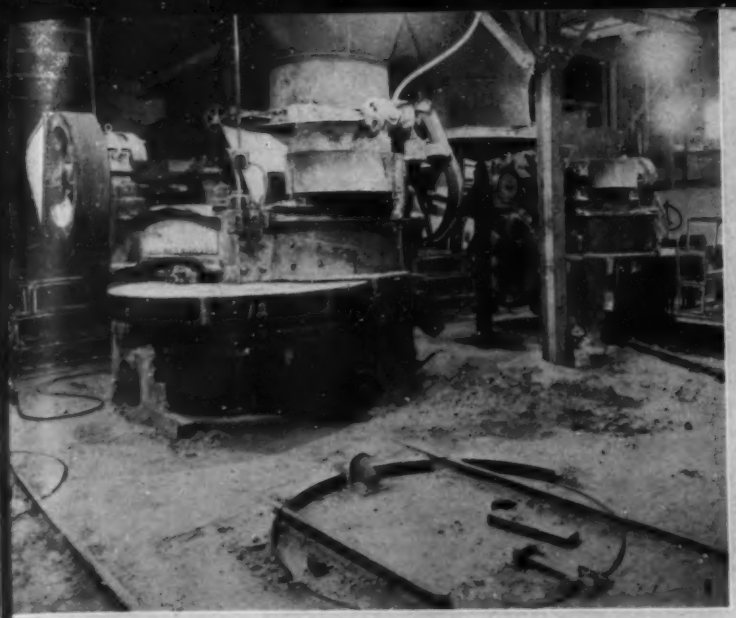
The cinders (or gravel), cement, and lime are mixed in the rod mill, the cinder feed being regulated so that ample time is allotted to crush the cinders. These mixes are then elevated to a paddle mixer over the Besser machine where the cement and water are added to the mixture. Cinders, low in lime and sulphur content, are secured locally from the Detroit Edison Co.

A separate and distinct operating unit also has been placed in service solely for the manufacture of concrete blocks to increase the capacity and to enable production of concrete blocks simultaneously with sand-lime block through the other equipment.

This new unit consists of a wet pan on which cinders are crushed and the entire mixing operation takes place; a bucket elevator, and a Stearns Joltcrete machine. Materials dumped from trucks into the wet pan are elevated when mixed to a hopper feeding the machine. The block machine is rated at nine 8- x 8- x 16-in. units per minute.

High Pressure Curing In Four Long Kilns

Sand-lime brick and block and all concrete products are cured under high pressure steam in four kilns 85 ft. in length and 6 ft., 6 in. in diameter. From two to three hours are required to fill



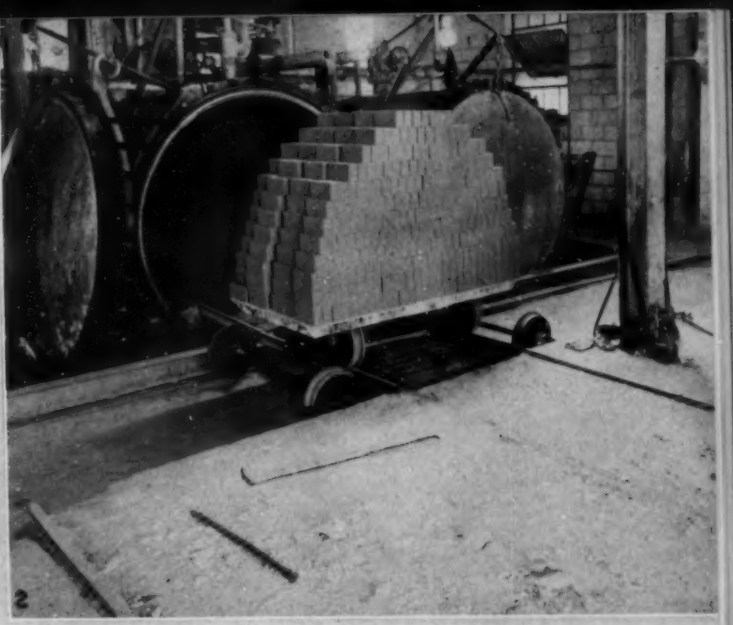


Fig. 1: Brick presses on which cinder concrete brick and sand-lime brick are manufactured at the rate of 30,000 of each type unit in eight hours

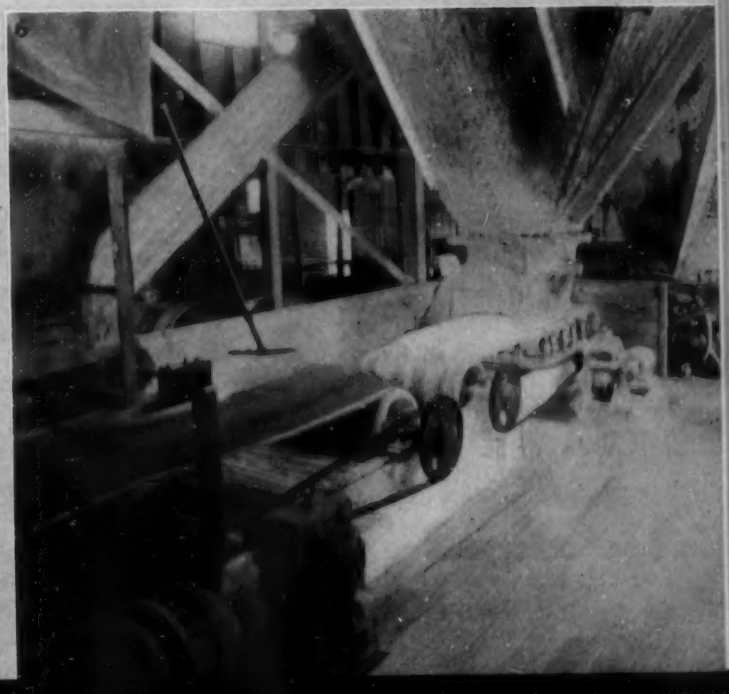
Fig. 2: Industrial car loaded with brick ready to be placed in curing kiln for high pressure treatment

Fig. 3: Wet pan in which materials are crushed and mixed in connection with operation of the semi-automatic stripper block machine

Fig. 4: Rod mill in which sand, gravel or cinders are mixed and crushed

Fig. 5: Large, fully-automatic machine for the manufacture of concrete and sand-lime block. On right are material bins and rod mill

Fig. 6: Belt conveyor feeders for proportioning hydrated lime and sand into the rod mill when making sand-lime brick or block. The same feeders are used for cinders in making cinder block which is an independent operation



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Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns Joltcrete, Stearns mixers, pallets, Straublox Oscillating attachments, etc.

Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

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CONCRETE PIPE CO., INC.
COLUMBUS, OHIO

a kiln with concrete block on industrial racks, which allows for an initial set to take place. After steam is introduced, several hours are required for slowly building up the steam pressure in the kilns to a pressure of 120 p.s.i. at 350 deg. F. The cycle is completed in 8 hr. for concrete block and 12 hr. for sand-lime brick and block, after which the units are removed ready for immediate delivery.

High pressure steam curing has the advantage of completing the hydration of the cement in a short time, thereby reducing much of the volume change that otherwise must be eliminated by a curing process requiring a longer period of time. Shrinkage, of course, is one of the factors which must be controlled if cracked and leaking walls are to be eliminated.

Curing under high pressure, by virtue of completing most of the cement hydration in a short interval of time, develops high early strengths, which permits deliveries without curing delays and reduces yard storage that ordinarily must be maintained if other types of curing are used.

Under high pressure steam curing it is claimed that the calcium hydroxide produced combines with any fine silica present to form an insoluble calcium silicate which increases the strength of the unit. In tests at the Detroit Testing Laboratory, the concrete units manufactured by Block and Brick, Inc., have had compressive strengths comparing favorably with those for units yard-cured for many days, and with strengths that justify delivery immediately after curing. Absorption tests for the gravel block run in the neighborhood of 8 percent. Advantage of these factors has been taken by the company to keep a minimum investment in stock, which consists mainly of special units. The plant capacity is sufficient normally to produce enough units for current demands without the necessity of drawing from stock. In addition to reducing yard storage, the turnover of pallets has been quickened, the units have a smooth appearance and a uniform, lighter than ordinary color.

F. Langdon Hubbard is president of Block and Brick, Inc., Russell A. Alger, Jr., vice-president; Rex Jacobs, secretary-treasurer; Frank Whelan, assistant secretary-treasurer and Charles Bisset, superintendent in charge of operations.

CEMENT COLORS

STAR and ANCHOR
COLORS
Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.

Concrete Block for Large Housing Project

CARBON CONCRETE BLOCK CO., Lowellville, Ohio, suburb of Youngstown, is extremely busy these days making 200,000 concrete block for the new $3,800,000 Westlake low-cost housing project. Crushed limestone screenings are used for aggregate. All blocks are steam cured in six kilns, each 75 ft. long and 9 ft. wide and with a capacity of 1160 blocks. Live steam raises the temperature to 100 deg. F., to which the blocks are subjected for a period of 48 hours. An electric truck, holding a rack with 53 blocks, is used to transport the green blocks to the kiln.

Organize Concrete Products Co.

WAYNESBORO CONCRETE PRODUCTS CO., Waynesboro, Va., is the name of a new company to produce concrete bricks, blocks, pipe, sills and ready-mixed concrete. W. G. Mathews is president of the new company, and H. S. King will be treasurer and general manager. The company has purchased property near the Mathews-Curtis Company gravel plant. Mr. King, treasurer and general manager, is a graduate of Virginia Polytechnic Institute in mechanical engineering, class of 1928, and until recently had been with a large construction company in New York.

Start Concrete Pipe Factory for Irrigation Project

SOUTHWESTERN CONCRETE PIPE CO., Benito, Texas, recently established a branch pipe factory on the outskirts of Hargill, Texas, to furnish pipe for 130 miles of irrigation line. J. R. Hopkins, manager of the branch, reports that the production will be brought up to 5760 ft. of pipe per day. At present three pipe machines are in operation. A tamper type unit has a production of twenty 24-in. pipe per hr.; a packer head type is used for the smaller sizes, including 12-in. and 18-in. pipe; and a third type, designed by the company, is used for 20-in. and 24-in. pipe. Bins for aggregates hold 70 carloads of material. A Northwest clamshell transfers material from cars to bins.

Asbestos Cement Pipe

ASBESTOS CEMENT PIPES, INC., Woodridge, N. J., Bergen County, is the name of a new company which will make asbestos cement pipe and other products. A 30-acre tract has been purchased and a new plant will be built. Raw materials used are chalk, clay, cement, asbestos, hair wool, mineral felt and other insulating materials.

New Method of Making Molded Concrete Units

Cemenstone Corporation, Pittsburgh, Penn., has announced a new method and new equipment for the manufacture of standardized concrete units. Leslie M. Johnston, president of the company, in making the announcement, stated that the system provides for standards of size and quality in precast concrete such as have been developed for steel. The concrete units also have been coördinated with standard steel construction elements.

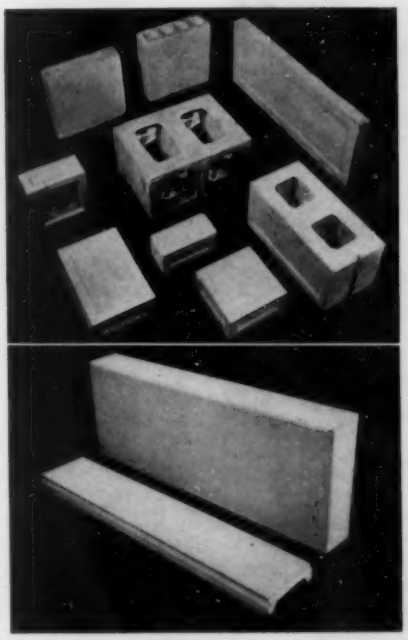
Use of vibration, heat and mass production methods are the three main features of the new system of manufacture. Vibration while molding is designed to produce a finer texture and a stronger product; heat is used to hasten the chemical reaction of the cement when it is brought in contact with the other materials and water, and it is said to induce uniform shrinkage and a product of a uniform light color.

Manufacturing Methods

The equipment consists of a rigid steel frame over a curing chamber which produces a temperature of 160 deg. F. A hopper, which fills the molds with concrete, mixed to a plastic state, rides on the top of the frame, together with vibrators which agitate the mix. Steam from the curing trough keeps the molds constantly hot. After the concrete has hardened sufficiently, the products are lifted out in large groups and unloaded for aging under cover and in a constant temperature, to prevent unfavorable weather conditions from arresting the proper chemical reaction within the concrete.

Among the products which can be produced by this method are blocks for wall construction and channel-shaped, short-span slabs for floors and roofs, as well as long-span slabs, concrete plank, joists, brick, insulating tile, and veneering; also curbs, sidewalks, and fence posts. It is claimed that the veneering will be capable of taking a large number of surface treatments. Another type of unit will be a block inset with glass panels so that they will not only be load bearing wall units, but will admit light. These units will be developed for air-conditioned buildings and for structures which require the elimination of outside dirt and dust and to admit light through basement wall structures. Another type of product, made with portland cement, expanded by the addition of aluminum powder to make it highly cellular, is said to have high insulating qualities and to weigh only one-fourth as much as ordinary concrete.

Blocks made by this new system may have plain or paneled faces and recessed ends for the reception of sash. They are said to be adaptable for walls, sills and jams, lintels, corners, pillars, and coping. Tested strength of the blocks is reported to exceed the most exacting building codes, and absorption is stated to be less than half that allowed by the municipal authorities.



Various types of precast concrete units made by new process. Above are shown solid light-weight partition unit, hollow light-weight partition unit; veneering panel; fractional block inset with glass, full-sized block inset with glass; and panel-faced block. Below: A 5-ft. section of curbing, and a 5-ft. reinforced channel slab.

Short-span slabs are reinforced with ⅜-in. rods welded to a metal fabric mesh to form a truss. Each slab will carry a safe live load of 150 lb. to the square foot on a 5-ft. span, according to reported tests. They are said to be adaptable for floors, roofs, external wall structures, sidewalks or platforms.

All of the products manufactured by the new system can be made with sand, gravel, stone or other easily obtainable aggregates. Light-weight units can be

(Continued on page 65)

Left: Pouring starts at one end of "mill." By the time the last molds are poured, the first are ready to be emptied, permitting continuous production. Molds are interchangeable to make any desired product. Right: When molds are ready to be emptied, they are lifted out with the aid of the frame and swung over to the stock piles.

NEW LITERATURE

About Your Business

The following literature, recently published, is available free, upon request:

Crushing, Sizing, Conveying, Storing Equipment.—Rogers Iron Works Co., has brought out bulletin No. 302, which describes and gives specifications for its complete line of equipment. Also included is a crusher product chart of size percentages, showing the percentage retained and the percentage passing through round openings at various crusher settings.

Explosion-Proof Motors.—Louis Allis Co. has issued bulletin No. 508E describing and illustrating its new line of a.c. and d.c. explosion proof motors.

Bucket Carriers.—Link-Belt Co. has published a new 24-page illustrated catalog, No. 1720, on the Peck overlapping pivoted bucket carrier.

"Electric Ear."—Hardinge Co., Inc., Bulletin No. 42 gives complete details regarding the installation and operation of the "electric ear." The text is supplemented by excellent illustrations and charts.

Agitators.—Patterson Foundry and Machine Co. has issued a bulletin describing the features embodied in its new Unipower agitator.

Pumps.—Worthington Pump and Machinery Corp. Bulletin W-319-B1A tells about the Worthington high-pressure, forged-steel-casing centrifugal pumps. It also contains several installation views of these units, together with a list of important installations and conditions of service for each.

Concrete Floor and Roof Slabs.—Price Brothers Co. has issued two circulars; one shows the use of Flexicore form in home construction as flooring and roofing and the other shows the use of the Flexicore method in the construction of ducts, conduits and other circular openings in concrete.

Grinding.—Allis-Chalmers Mfg. Co., Milwaukee, Wis. "Better Grinding at Lower Cost," bulletin 1462-B, describes its compeb, tube, ball preliminator, rod, and batch mills, as well as feeders and grinding media used in connection with these mills. This 23-page booklet is profusely illustrated with flow sheet diagrams and cut-away photographs.

Grounding Rods.—Anaconda Wire and Cable Co. has brought out a booklet describing Anaconda star ground rod and Everdur ground wire clamps. It also gives engineering data on grounding.

Poidometers.—Schaffer Poidometer Co. has just issued a bulletin about six applications of Schaffer Poidometers: with liquid measure, with dust tight cover, with non-flood hopper, mounted on trucks, with magnetic discharge pulley and the extra long Poidometer.

Trailer Mounted Crusher. — Universal Crusher Co. has issued bulletin No. 11 covering their line of trailer type crushers.

Diesel Engines.—Worthington Pump and Machinery Corp. has brought out bulletin S-500-B36, which gives a detailed description of its Type CC direct-injection, totally enclosed, vertical four-cycle Diesel engines.

Grading Equipment and Diesel Engines.—R. G. Le Tourneau, Inc., has begun publishing LeTourneau Methods, a bi-monthly organ dedicated to the interests of lower costs and more efficient construction methods. Booklet, form 4658, has been issued. It describes practical jobs for Diesel electric generator sets of from 20 to 80 k.w. capacity and gives fuel and operating costs of actual installations.

Feeders, Conveyors and Screens.—Allis-Chalmers Mfg. Co. has issued a new bulletin (No. 1833-A) illustrating and describing their complete line of Utah Electro-Magnetic feeders, conveyors and screens which operate without rotating or sliding parts.

Compressors.—Ingersoll-Rand Co. has published a new twenty-eight page catalog on its line of "ES" compressors. In addition to the detailed description of these machines the catalog has four pages of illustrations of some in actual use.

Lead Bearing Steels.—Joseph T. Ryerson & Son, Inc., has brought out a new bulletin about Ledloy steel. It includes results of actual machining tests.

Compressors.—Sullivan Machinery Co., has prepared a new catalog which illustrates and details in a clear, simple manner their line of air and gas compressors known as the Class WN-112.

Concrete Block.—Mortarless Tile Machine Co., Inc., has issued a bulletin describing its concrete block machine, which manufactures blocks that are interlocking and laid in the wall without mortar.

Flexible Couplings. — Lovejoy Flexible Coupling Co. has brought out a new catalog which describes the L-R flexible couplings.

Aggregate Production Equipment.—Denver Equipment Co. Bulletin No. S-O-B contains data, pictures and flow sheets of the complete line of Denver milling plants, crushers, feeders, ball mills, classifiers, thickeners, and other equipment for use in the industry.

Dust Collectors. — American Foundry Equipment Co. has brought out a new illustrated circular which clearly explains the mechanical features and the construction of the American assembled type "Dustube" dust collectors.

Alloys.—Haynes Stellite Co. "Products of Haynes Stellite Company—Tables of Physical, Mechanical and Chemical Properties," is an attractive new booklet published by this company about its alloys.

Mixers, Pumps and Hoists.—Construction Machinery Co. has brought out a new catalog about its complete line of equipment. The many photographs and cut-away illustrations detail the features of the firm's equipment.

Diesel Power.—Caterpillar Tractor Co. has issued two interesting circulars describing and illustrating the many uses to which Diesel power is put. They are entitled. "Power and Traction for Mines, Pits and Quarries" and "Fatter Pickings with 'Caterpillar' Diesel Power."

Driers and Screens.—Koppers-Rheolaveur Co. has issued a new folder describing the use of Carpenter Centrifugal Driers in all industries where there are granular materials to be dried and a leaflet concerning Koppers wedge-wire screens for the removal of free moisture from fine material.

New Incorporations

Piney Mountain Rock Co., Inc., Greenville, S. C., has been granted a charter. Capital stock is $5000. Officers are R. C. Willimon, president and treasurer and Henry P. Willimon, secretary.

Midwest Sand and Gravel Co., 201 N. Wells St., Chicago, Ill., has been incorporated with a capital stock of 200 shares, $100 par value. Incorporators are I. D. Levin, M. P. Cohen and F. E. Lovis.

Osborn and Roys, Inc., 825 27th St., Moline, Ill., is the name of a new corporation with a capital of 200 shares no par value. Incorporators are L. I. Osborn, C. C. Roys and G. L. Osborn, and correspondent is Joseph R. Rosborough.

Inland Lime & Stone Co. of Wisconsin, Milwaukee, has been incorporated with a capital of 100 shares at $100 each, by Carl F. Mikkelson, Wm. J. Keating and Edmund B. Shea.

Homewood Sand and Gravel Co., 134 N. LaSalle Street, Chicago, Ill., has been incorporated with a capital of ten shares, no par value. Incorporators are F. DeYoung, M. P. McElwee and T. Miedema; correspondent is Samuel J. Horwitz.

Gosport Gravel Co., Inc., Gosport, Ind., has been granted a charter. Capital stock is 500 shares, no par value and incorporators are Raymond E. Long, J. Frank Regester and James R. Regester.

Cement Art Products, Inc., Wilmington, is the name of a new Delaware corporation with a capital of $150,000. M. M. Lucey, M. K. S. Lucey, and A. R. Shannon are incorporators.

Rion Crushed Stone Corp., Rion, S. C., has been granted a charter with a capital of $100,000. H. B. St. Lawrence is president and S. E. Jennete is secretary and treasurer.

Norwalk Sand and Gravel Corp., Norwalk, Ohio, has been granted a charter with a capital of 80 shares, $100 par value. Daniel Deering is president; Thomas McLean, vice-president; William J. Sculley, treasurer and Edward Eason, secretary.

Concrete Masonry Industries, Milwaukee, Wis., has been incorporated by Walter A. Sherman, Frank E. Glasa, Otto Ladwig, Jr., and James T. Drought.

Cadman Gravel Co., Redmond, Wash., has been incorporated with a capital of $25,000 by Floyd F. Volk, H. B. Cadman, B. L. Cadman and H. A. Volk.

Legere Stone Co., Inc., Somerville, Mass., has been incorporated with a capital of 100 shares common stock, no par value, by Arthur A. Legere, president and treasurer; Alice E. Smith, clerk, and Pearl E. Bradford.

Shea Quarries, Inc., Rollstone Hill, Fitchburg, Mass., has been granted a charter. Capital is 500 common shares, no par value and officers are Timothy R. Shea, president; Vincent H. Shea, treasurer; and Vanda Baron, clerk.

Manufacturers

Foote Bros. Gear & Machine Corp., Chicago, has appointed G. T. Luippold, 115 South Hope St., Los Angeles, Calif., as district representative and sales engineer.

Hercules Powder Co., Wilmington, Del., announces the election of Charles A. Higgins as president. Mr. Higgins has been with the company since 1915 and has been vice chairman of the executive committee since 1933. He succeeds R. H. Dunham, who continues as chairman of the board of directors, the position he has held jointly with the presidency since the organization of the company in 1912. Mr. Dunham also will serve as chairman of the finance committee.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces the transfer of Henry W. Erickson, engineer in the crushing, cement and mining division to the El Paso district office as a representative specializing on mining machinery built by the company.

Molded Concrete Units

(Continued from page 63)

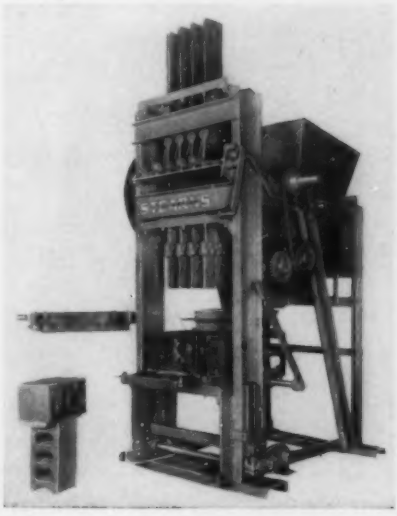
made with slag, cinders or other lightweight aggregate.

Patents have been obtained in the United States and foreign countries, but the Cemenstone Corporation will not manufacture the concrete products. Equipment will be supplied to licensees in designated areas throughout the United States, who will be granted exclusive rights to manufacture. D. J. Kennedy Co., Pittsburgh, Penn., is the corporation's first licensee to start production.

W. P. Witherow, founder of the Witherow Steel Corp. and president of Blaw-Knox Co., is chairman of the Cemenstone Corp. board of directors. Leslie M. Johnston, former vice-president and general manager of the A. M. Byers Co., is president, and Albert Henderson, who developed the new system, is consulting engineer.

Special Facing Block Machine

STEARNS MANUFACTURING Co., Adrian, Mich., has introduced a new machine for use in plants that have a market for blocks made with special facing material and other than plain faces. This is the Stearns Clipper down-face block machine, making rock, plain, panel and various other face designs in fulls, fractionals, single and double corner, for 4-, 8-, 10-, and 12-in. wall thickness. The rated capacity is 150 standard 8- x 8- x 16-in. blocks per hour. It is said that the machine may readily be converted for the manufacture of stripper blocks by the substitution of a different mold box, tamp feet, and a stripping device. On the other hand, the owner of a Stearns Clipper stripper, Stearns Jr. or Ancho Jr. stripper may equip his machine t make faced blocks by applying th down-face assembly.



Down-face block machine for making rock, plain, panel and other face designs

Minimum Wages Under the Walsh-Healey Act

(Continued from page 50)

effect; and it was the further judgment of the boards that within the wage areas thus established, it would probably not be necessary to make further differentials based upon metropolitan and rural locations. As a general policy, it was felt that the substance of the procedure used in drafting the Code could be applied with equal force to the determination of prevailing minimum wages under the Wash-Healey Act.

This action is not to be accepted as meaning that it supports any one wage determination in any areas as opposed to another determination or that it overlooks the fact that there are fluctuations in any wage area which could possibly be determined—fluctuations not only as between rural and metropolitan locations, but also a definite lack of uniformity in wage practices, whatever the basis of comparison which is used.

Secretary Ahearn has called attention to two amendments; one by Congressman Healey and a companion bill by Senator Walsh which would include contracts for the purchase of supplies that exceed $2000 in amount in lieu of $10,000 as now provided, and the Walter Bill, which provides that no decision, minimum wage determination or order of the Secretary would take effect until published in the Federal Register or until notice of such decision has been given to all interested persons. It further provides that any person aggrieved by any decision may obtain review thereof in the appropriate U. S. Circuit Court of Appeals, and filings of petitions for review would operate as a stay of any order of the Secretary unless otherwise ordered by the court.

Asphalt Institute Establishes Washington Office

MAJOR WALTER R. MACATEE, district engineer of The Asphalt Institute, at Cincinnati, Ohio, is the head of the new district engineering office of the Institute in the Transportation building, Washington, D. C. The announcement states that the purpose of the Washington office is to bring to the scientific departments of government the full cooperation of the asphalt industry in working out the problems of bituminous construction.

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You can meet the strictest specification requirements with STANDARD screens. Their tapered perforated holes assure less blinding. Superior quality means longer wear and less repair.
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CRUSHERS
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17 John Street New York, N. Y.

NEWS of the month

Organize Cement Company in New Mexico

NEW MEXICO PORTLAND CEMENT CO., Albuquerque, N. Mex., was recently chartered by the State Corporation Commission to manufacture and sell cement. However, no plans have been made for setting up a mill. The company has an authorized capital stock of 15,000 shares without par value; 20 shares issued. Incorporators are Dudley Cornell, D. A. Macpherson, Jr., and Rebecca Sabin.

Union Lime Reorganizes

UNION LIME CO., INC., Republic, Wash., recently held a reorganization meeting at which new officers were elected. Austin Ward, superintendent of the plant, was elected president and chairman of the board; Richard Phillips was made vice-president; and Ralph C. Hove was elected secretary-treasurer. President Ward announced that the plant would soon go into production on a 24-hr. per day basis. This plant was constructed last summer.

Organize Sand Company in Kansas

BLUE RIVER SAND CO., Manhattan, Kans., is the name of a new sand and gravel company which is now reported to be operating on the Blue river, northeast of Manhattan. A washing and screening plant is part of the equipment. Ross Graves, L. G. Davis and Allen Norcross are the owners of the new enterprise.

Replacing Crushed Stone Plant Destroyed by Fire

BEYER CRUSHED ROCK CO., Kansas City, Mo., now has under construction a new screening and crushing plant which will replace the one destroyed by fire on October 28, 1938. When completed, the new plant will have a capacity of 1000 tons daily. Stone is obtained by underground mining. Rock is hand loaded and trucked to the crusher. Equipment includes a No. 7½ Gates primary crusher, one 24-in. and one 42-in. double-roll Webb City type secondary crusher, two 4- x 10-ft., triple-deck Selectro screens, an elevator, 75-ft. centers, centrifugal pump, and a 180-hp. Fairbanks Morse, 3-cylinder Diesel engine for power. There are 10 3-ton General Motors trucks.

Construct Raw Mill Control Building

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., is constructing a raw mill control building and installing equipment for positive control of the kiln feed mix at Cape Girardeau, Mo. Among the additions are a rotary dryer, to be fired by coal pulverized by unit direct-firing mills used to fire the kilns; a hammer mill and dry pan for crushing and pulverizing admixtures; a series of clay tanks for blending the clay; and six proportioning scales to regulate the proportions of each ingredient to go into the mix.

Install Dust Collectors

KOSMOS PORTLAND CEMENT CO., Kosmosdale, Ky., is installing dust collectors to recover flue dusts from the stack and in the raw mill grinding and pack house departments.

Lone Star Reports Heavy Capital Expenditures

ADDITIONS to plants and properties in 1938 cost the Lone Star Cement Corp., New York, N. Y., a total of $1,853,889. The major expenditure represents a new modern steam power plant for its Brazil property. Capital expenditures totaling $1,452,837 have been authorized for additions and improvements to plants during 1939. The company reports that its new Parana, Argentine, plant has been operating since March, 1938, and that the demand for its product is increasing steadily.

Start New Michigan Gravel Plant

CONSTRUCTION AGGREGATES CORP., Chicago, Ill., started operation of its large gravel plant at Ferrysburg, Mich., on April 1, according to W. J. Wipperfurther, general superintendent. About 60 men will be employed when the plant swings into full production. Last year it is reported that this company shipped more than 600,000 tons of gravel and sand. The company recently installed a 170-hp. Diesel engine in its tug, the Robert E. Johnston, replacing the old steam engine. Another tug will be similarly equipped.

Cement Company Rebuilds Sand and Gravel Plant

MISSOURI PORTLAND CEMENT CO., at Memphis, Tenn., is completing the entire rebuilding of its sand and gravel plant. One of the principal changes in the plant is installation of an intermediate de-watering plant to shorten the pumping distance from the hydraulic dredgeboat and the substitution of a modern belt conveyor system for barges in delivering material from the dewatering station to the screening plant. The screening plant has been entirely rebuilt and sized material is transferred from the plant bins over belt conveyor to new concrete silos for loading into cars and trucks.

Complete Stone Crushing Unit in Missouri

THE FRANK FLINN CONSTRUCTION CO., Dodson, Mo., completed its new stone crushing and screening plant on March 18. The old plant was located at 85th and McGee streets, Kansas City, Mo. The new one has a capacity of 750 tons daily and is an underground mining operation, the rock being hand loaded

Above: Recently completed crushing and screening plant of the Frank Flinn Construction Co., Dodson, Mo. Below: Double Roll Crusher Installation

into dump trucks which carry the material to the crusher. Crushing is done with a new No. 6½ Allis-Chalmers unit and 42-in. Webb City double rolls. A bucket elevator carries the crushed rock to two 3- x 10-ft. triple-deck Selectro screens. Aggregate bins have a capacity of 900 tons. The company also operates a small plant for the production of pre-mixed asphalt materials. Officers are: Frank Flinn, president; Byron G. Bliss, vice-president; and Alta S. Flinn, secretary-treasurer.

Illinois Uses Large Tonnage of Agstone

ILLINOIS again led states in the middle west in the use of agricultural limestone with 1,160,339 tons in 1938. This is the third successive year that the state has used more than one million tons. A very complete report has been prepared by W. H. Voskuil and G. N. Oliver of the Illinois Geological Survey in circular No. 47 in cooperation with the Mid-West Agricultural Limestone Institute. Illinois also produces a considerable quantity of agstone for other adjacent states and in addition takes a substantial tonnage from adjoining states.

Buy More Property for Cement Operations

NORTH AMERICAN CEMENT CORP., Albany, N. Y., has purchased 500 acres of land near Catskill, N. Y., which contains large deposits of limestone. It is reported that the North American Cement Corp. now owns nearly 1000 acres of land in the Town of Catskill.

Changes in Ohio Sand Specifications

IMPORTANT CHANGES have been made in the Ohio Department of Highways specifications covering fine aggregates. Formerly Section M-2.1 covered both natural and manufactured sand. Under the new specifications this section will cover natural sands only. The grading has been changed as follows:

Passing Sieve	New Grading
⅜ in.	100%
No. 4	95-100%
No. 8	70-95%
No. 16	45-75%
No. 30	20-50%
No. 50	10-30%
No. 100	2-10%
Clay and silt by weight.....	0-4%

In the old grading, No. 8 was 70 to 90 percent; No. 50 was 5 to 25 percent; No. 100 was 0 to 5 percent; and clay and silt by weight was 3 percent. The sulphur limitation for sand used in portland cement concrete was added, although this limitation has been carried in the proposals for some time.

Section M-2.2 formerly covered both natural and manufactured sand. Under the new specifications this section will cover natural sands only. All gradings remain the same, except No. 50, which is now 10 to 40 percent instead of 5 to 40 percent; and clay and silt by weight is now 4 percent, whereas it was formerly 3 percent. The maximum allowable percentage of silt in Sec. M-2.3 has been changed from 3 percent to 4 percent.

In Sec. M-2.4, the new grading is No. 8, 100 percent; No. 16, 50 to 75 percent; No. 50, 30 to 50 percent; No. 100, 10 to 30 percent; clay and silt by weight, 5 to 20 percent.

Sec. M-2.11 is a new section covering manufactured sand. Sand meeting the requirements of this section is an alternate with sands meeting the requirements of Sec. M-2.1 or Sec. M-2.2. Copies of the new specifications are now available from Ohio Department of Highways, Columbus, Ohio.

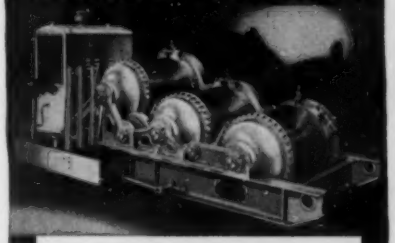
Manufacturing Magnesium Hydrate

OLIVER KING SAND AND LIME CO., Knoxville, Tenn., long a manufacturer of high calcium lime products, has placed on the market "Holston Magnesium Lime", a hydrate which, according to preliminary tests is high in plasticity and light in color. A deposit of stone containing 38 percent magnesium, low in iron and alumina, was discovered practically adjacent to the lime plant which had been producing high calcium lime only from the predominant rock ledge, which contains less than 0.5 percent $MgCO_3$. The new product is being placed on the market, in the hydrate form, as a mason's lime and is being manufactured without additional equipment. Two 11- x 25-ft. hand coal-fired vertical shaft kilns with a combined daily capacity of 18 tons have been set aside for the new product. The quicklime is hydrated in a Schaefer hydrator and pulverized to 400-mesh fineness. Stone from the new deposits is trucked to the plant.

U. S. Recompenses Gravel Plant for Flood Losses

THE SENATE passed a bill by Sen. Charles McNary to authorize the Treasury to pay $33,500 to Lofts and Son of Hood River, Ore., for loss of their sand and gravel plant flooded by waters back of Booneville dam. The firm had leased the land near the mouth of the river for many years from the Or[illegible]n Lumber Co. Water back of the d[illegible] covered the land. The government's land appraiser acquired the rights to the land from the lumber company and legislation was necessary to reimburse the sand and gravel company.

BUYING A HOIST?



JAEGER Touch Control Hoists—30 to 100 H.P. Offer You . . .

1: Giant Expanding Frictions, as on $15,000 Shovels, giving easy finger-tip control of loads.
2: Self-Aligning Anti-Friction Bearings standard equipment.
3: Accurately Balanced Drums.
4: Rigid Construction, Multi-Cylinder Power, Silent Chain Drive. 1 to 3 Drums (interchangeable). Gas or Electric.

Standardized construction (only 3 basic types for 30—100 H. P.) means big savings, lower prices. Get new Catalog.

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PROPORTION ACCURATELY

WITH POIDOMETERS

These efficient, accurate, economical weighing and feeding machines have proven their value to operators of cement mills, for accurately proportioning stone and clay—also clinker and gypsum by weight and not by volume.

Also being used for weighing and feeding material to all types of Grinding Mills.

The Poidometer is self-contained. The scale beam is graduated in pounds or kilos, and can be set at whatever amount of material may be required per foot of belt travel; the gate is then adjusted to suit this weight, and the machine will deliver the pre-determined amount of material with an accuracy of ninety-nine per cent.

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VIBRATING SCREENS
Give GUARANTEED SCREENING
Tell us what you want to screen and we'll be glad to quote you a SECO screen that will *positively* do your work—continuously—efficiently—economically—day in and day out—year after year.
SECO, with its perfect balance and positive control of gyrating motion, is still the most advanced step in vibrating screen design.
SECO USES NO SPRINGS
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SOME GOOD TERRITORY STILL OPEN
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BUFFALO, N. Y.

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10" x 36" Anti-Friction Bearing Crusher
7 REASONS WHY!
1—UNEQUALLED PRODUCTION (Users Report)
2—LOWEST MAINTENANCE COST (Users Report)
3—UNMATCHED RUGGEDNESS (Experience Shows)
4—LARGE CAPACITY BEARINGS (Failures Unknown)
5—LARGE DIAMETER ECCENTRIC SHAFT (Failures Unknown)
6—HEAVY, WELL PROPORTIONED CRUSHER BED (Failures Unknown)
7—DEPENDABLE AND LOWER PRODUCTION COSTS (Results—Confirmed by Continued Repeat Orders)
Equipped with Bronze or Roller Bearings
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Write for Bulletins Nos. 302 and 304
CRUSHER BUILDERS FOR 40 YEARS
Give Us Details of Your Crushing Problems
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FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Alpha Portland Cem.	$0.25	June 24
Calaveras Cement Co., pfd.	1.00	Mar. 31
Lehigh Portland Cem., pfd.	1.00	July 1
Longhorn Portland Cem.	.25	Apr. 1
Pacific Portland Cem. Co., pfd.	3.25	Apr. 15
Riverside Cement Co.	1.50	May 1
U. S. Graphite Co.	.25	Apr. 15
Westvaco Chlorine Prod., pfd.	.37½	May 1

KELLEY ISLAND LIME & TRANSPORT CO., Cleveland, Ohio, had a net profit of $239,805 for 1938, equal to 78c a share on 308,952 shares. Earnings in 1937 amounted to $1.57 a share.

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MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, announced to its stockholders that business for the first quarter in 1939 showed an increase of 15 percent over the same period in 1938. The company expects to have all its plants in operation within a few weeks. It is anticipated that the improved business will continue into the summer at least. All officers were reelected at the meeting.

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CONSOLIDATED ROCK PRODUCTS CO., Los Angeles, Calif., showed a net profit of $8,193 for the year ended December 31, 1938, after all charges, including provision for bond interest, depreciation, depletion and amortization. This compares with a net loss of $72,534, after similar charges, reported for 1937. Net sales last year were $3,464,952, an increase of $108,151 over the total for 1937 when they amounted to $3,356,801.

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NATIONAL GYPSUM CO., Buffalo, N. Y., for the first two months of 1939 reported a net profit amounting to approximately $59,000 compared with $5,800 in the same 1938 period.

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BESSEMER LIMESTONE & CEMENT CO., Youngstown, Ohio, reports a net income of $8,257 for the year ended December 31, 1938, as against $149,801 for the same period in 1937. Net sales in 1938 were $1,105,690 as compared with $1,511,384 in 1937.

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BLUE DIAMOND CORP., LTD., Los Angeles, Calif., producer of sand, gravel, cement, gypsum and lime, reports a net income after all charges of $226,631 for the period ending December 31, 1938. This compares with $245,536 for a like period in 1937. Net sales were $3,264,884 in 1938 as against $3,737,034 in 1937.

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LEHIGH PORTLAND CEMENT CO., Allentown, Penn., had a net income of $704,003 for the year ended December 31, 1938, before dividends, as compared with $1,250,545 in 1937. After paying dividends on common and preferred, there was a deficit of $277,308 in 1938 as compared with a deficit of $93,897 in 1937. Net sales in 1938 were $12,073,737 as compared with $12,400,938 in 1937. Current assets on December 31, 1938, were reported as $13,188,937 as against $13,302,006 on December 31, 1937.

•

MARBLEHEAD LIME CO., Chicago, Ill., reports net income for the year ended November 30, 1938, as $5468 as compared with $31,770 for the same period ending November 30, 1937.

•

NATIONAL GYPSUM CO., Buffalo, N. Y., has announced that consolidated net profit for the first three months of 1939, after depreciation, depletion, interest, and income taxes, is $190,198 as compared with $112,175 for a like period in 1938.

•

PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., for the three months ended March 31, 1939, reports a loss before depreciation of $95,860 as compared with a loss of $152,249 in the like period of 1938. For the twelve months ended March 31, the company had a profit before federal income taxes of $205,199. This compares with a loss in the preceding 12 months of $73,356. "Business shows better promise this year than for quite some time," said Chairman Victor N. Roadstrum, in his report to stockholders.

•

AMERICAN LIME & STONE CO., Bellefonte, Penn., showed a net loss of $36,640 for the year ended December 31, 1938. In 1937 the company had a profit of $29,266.

•

ALPHA PORTLAND CEMENT CO., Easton, Penn., had a net income of $235,107 for the period ended December 31, 1938,

after depreciation, depletion, federal income taxes, etc., equal to 37c a share on 639,500 no-par shares. This compares with a net profit of $234,755 or 36c a share on 642,100 shares of common in 1937. Net sales in 1938 were $6,332,661 as compared with $6,147,790 in 1937.

•

DIAMOND PORTLAND CEMENT CO., Middle Branch, Ohio, reports a net income of $116,358 for the year ended December 31, 1938, as compared with $74,768 in 1937. After paying dividends of $72,000, the balance, $44,358, was carried to surplus.

•

KENTUCKY ROCK ASPHALT CO., Louisville, Ky., reports a net loss of $18,586 for the year ended December 31, 1938, as against a loss of $12,499 in 1937, after all charges. Net sales in 1938 were $697,239 as against $422,440 in 1937.

•

SUPERIOR PORTLAND CEMENT, INC., Seattle, Wash., showed a net income of $257,661 for the year ended December 31, 1938, after all charges. Net profit for 1937 amounted to $428,363.

•

ARUNDEL CORP., Baltimore, Md., showed a net income of $1,007,783 for the year ended December 31, 1938, according to a revised report, as compared with a net income of $813,724 in 1937.

•

UNITED STATES GYPSUM CO., Chicago, Ill., for the first quarter of 1939 reported a net income of $990,696, after charges, as compared with $688,348 for the same period in 1937.

•

UVALDE ROCK ASPHALT CO., San Antonio, Texas, in a recently published balance sheet, showed a property valuation of $478,577 on December 31, 1938, and current cash assets of $23,398. This compares with a property valuation of $358,207 on December 31, 1937, and cash assets of $148,120.

•

FEDERAL PORTLAND CEMENT CO., Inc., Buffalo, N. Y., had a net income, after depreciation, depletion, amortization, interest, etc., of $8,144 for the year ended December 31, 1938. There was a net income of $10,392 for a similar period in 1937.

•

CALAVERAS CEMENT CO., San Francisco, Calif., reported a net income of $52,682 for the year ended December 31, 1938. This compares with $109,972 for a similar period in 1937. Net sales in 1938 were $1,396,189 as against $1,550,981.

•

WARNER CO., Philadelphia, Penn., had an operating profit of $10,010 but after interest and other charges there was a net deficit of $415,488 for the year ended December 31, 1938, as compared with a deficit of $203,308 for the same period in 1937. Net sales in 1938 were $3,772,197 as compared with $5,722,062 in 1937.

•

GREAT LAKES PORTLAND CEMENT CORP., Buffalo, N. Y., had a net income of $2,558 for the year ended December 31, 1938, as compared with a net income of $197,277 in 1937. Sales for 1938 totaled $1,050,578 as against $1,492,272 in 1937.

•

AMERICAN AGGREGATES CORP., Greenville, Ohio, reported a net income of $168,797 for the year ended December 31, 1938, as compared with $157,886. Sales in 1938 were $1,316,564 as against $1,513,750 in 1937.

•

PACIFIC COAST CEMENT CORP., Seattle, Wash., had a net deficit of $164,506, after all charges, for the year ended December 31, 1938. This compares with a net loss of $36,575 for the same period in 1937.

•

DOLESE & SHEPARD CO., Chicago, Ill., crushed stone producers, had a net profit of $58,560 for 1938, after providing $45,120 for depreciation. This result compares with a loss of $32,982 in the previous year. Sales of crushed stone in 1938 were 245,696 cu. yd. greater than in 1937, a gain of 79 percent. Expenditures of $34,000 were made during the current year for screens, quarry trackage, and a new Diesel crane.

•

MATERIAL SERVICE CORP., Chicago, Ill., reports a net income of $158,623 for the year ended December 31, 1938, before Federal taxes, as compared with $102,906 for the same period in 1937. Net sales in 1938 were $8,208,623 as compared with $9,681,974 in 1937.

•

LONGHORN PORTLAND CEMENT CO., San Antonio, Texas, had a net profit of $491,793 for the year ended December 31, 1938, as against $309,656 for the same period in 1937.

•

IDEAL CEMENT CO., Denver, Colo., had net earnings of $2,517,139 for the year ended December 31, 1938, as compared with $3,411,157 in 1937. Sales in 1938 totaled $6,799,097 as compared with $8,351,795 in 1937.

•

SOUTHERN PHOSPHATE CORP., Baltimore, Md., reported a net income of $187,506 in the year ended December 31, 1938, as compared with a net income of $233,918 in 1937.

•

MONOLITH PORTLAND CEMENT CO., Los Angeles, Calif., earned a net profit of $368,871 for the year ended December 31, 1938, as compared with $281,067 in 1937.

New 3/4 Yard AMERICAN GOPHER

A Speedy, Rugged, Versatile, Money-Maker

Simple in design and rugged in construction, the Model 375 AMERICAN GOPHER — Shovel — Crane — Dragline — is fast, versatile; handles like an automobile. High operating speed insures a high daily yardage — and ruggedness insures steady production. A fast traveler. Write Department RP for Bulletin 700-G-5-2, just out.

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Saint Paul, Minn.

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NEW YORK & CHICAGO

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CROSBY CLIP

THE experience gained during twenty (20) years of constant effort to build the very best Vibrating Screens for handling your damp, sticky separations, is reflected in the performance of these NEW 1939 UNIVERSAL SCREENS.

They provide a solution to your most difficult screening problems, yet they cost so little.

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RACINE — WISCONSIN

NO OTHER CRUSHER WILL WORK FOR YOU LIKE THIS

DIXIE NON-CLOG Hammermills and Regular Stationary Breakers are unexcelled for primary, secondary or fine reduction. Note the simple, sturdy swing hammer construction and the specially designed, continually moving breaker plate which is an exclusive DIXIE feature. This is an exceptionally powerful and dependable unit for handling cement rock, clay, shale, silica, sand, gypsum, coal, etc. Made in 40 different sizes.

Write for further details.

DIXIE MACHINERY MFG. CO.
4109 Goodfellow Ave. ST. LOUIS, MO.

Shasta Dam Will Increase Coast Cement Demands

A LARGE POTENTIAL DEMAND for cement will be built up when contract awards for cement to supply the Shasta dam requirements are placed. The federal government Procurement Division has called for bids on May 1. Although concrete will not be poured until March, 1940, it is expected that cement plants will step up production to build up stocks. When work is under way, it is estimated that 100,000 bbl. monthly will be required. Bids will be based upon a maximum quantity of 5,800,000 bbl., which will be called for delivery within a three-year period. To meet conditions of planning and supply, three variants of specifications for cement, f.o.b. mill or storage point, are advertised. The first calls for 1,400,000 bbl. for 1940 delivery only; the second calls for bids upon the total quantity of 5,800,000 bbl. for the dam; and the third includes items covering the estimated maximum quantity to be required for delivery at a uniform rate of 100,000 bbl. a month and estimated fluctuating requirements in excess of that amount. California cement mills have a rated capacity of 1,900,000 bbl. monthly and northwestern mills at 600,000 bbl. monthly.

More Cement Plants Resume Operation

LEHIGH PORTLAND CEMENT CO., Metaline Falls, Wash., started up operations after a shut-down of less than two months during which there was a cessation of pouring operations at the Grand Coulee dam on account of cold weather.

•

ALPHA PORTLAND CEMENT CO., Hudson, N. Y., has resumed operation after the plant had been closed for several months.

•

UNIVERSAL ATLAS CEMENT CO., Allentown, Penn., has called back nearly 400 men to work at this plant after a shutdown of several months. It is expected that operations will be continued through the summer with the remaining schedule depending on orders.

•

LONE STAR CEMENT CORP., Hudson, N. Y., has announced through Superintendent Charles S. Andre that it has resumed operations at its Greenport plant after a seasonal shutdown for repairs and improvements.

•

MEDUSA PORTLAND CEMENT CO., Manitowoc, Wis., started up its kilns early in April with 150 men employed, according to Superintendent Frank Town.

•

IDAHO PORTLAND CEMENT CO., Spokane, Wash., has resumed operations at its plant near Pocatello, Idaho. The kiln will be started May 1, on the production of new clinker. The plant, which has a capacity of 1200 bbl. per day, has been down since the latter part of 1938. Sales of cement thus far this year have exceeded sales for a like period a year ago.

•

ASH GROVE LIME & PORTLAND CEMENT CO., Chanute, Kans., which has been idle since February 27, resumed production at a reduced capacity on March 17. Most of the employes had been kept busy during the shutdown making repairs.

Destroyed by Fire

KENTUCKY STONE CO., Louisville, Ky., had its new rock wool plant at Mullins, Ky., destroyed by fire in February. The entire plant was demolished, but was covered by insurance. It is probable that the plant will be rebuilt.

Sand and Gravel Shorts

STRATHMANN SAND AND GRAVEL CO., Paulsboro, N. J., has been sold to the Colonial Holding Co. at a sheriff's sale to satisfy a judgment of $134,000.

•

IT IS REPORTED that a new company has taken over the silica quarry at Hemptown, near Blue Ridge, Ga.

•

A "MOUNTAIN" OF SILICA is reported to have been discovered near Portland, Ore., and plans are under way to form a company which will develop the deposit.

•

NORTHEAST MATERIALS, INC., Jefferson, Ohio, has been organized to operate a washing and crushing plant at the McGoun pit, Kingsville Township.

•

ERNEST POE AND RAYMOND THORNTON, Pomeroy, Wash., have recently completed the installation of a sand and gravel washing plant just west of Clarkson, Wash.

•

THE NELLIS LIMESTONE CO., Ripon, Wis., has leased the gravel pit on the Ed Badtke farm for a term of years. It is planned to produce a high quality road gravel.

•

PAUL J. DEHNERT, local contractor of Evansville, Wis., has purchased the Fred Jorgensen property on South Second street and will operate a sand and gravel pit.

•

PORTSMOUTH SAND & GRAVEL CO., Portsmouth, Ohio, has purchased property owned by the National City Lines, Inc., which is adjacent to its land. The land will be used for additional storage capacity.

Prices Bid - Contracts Let

WILMINGTON, OHIO: Contract has been let to Cashman's Quarry in Highland county for 880 tons of stone at 90c a ton plus hauling charges of 50, 56 and 60c a ton and to Clyde C. Beam Co., Inc., at Blanchester for 1580 tons of stone at $1.10 plus hauling charges of 30, 38, 42, 45, 47 and 50 cents a ton. Achor's quarry has also been awarded a contract for 232 tons of stone at $1.31 a ton, which includes hauling charges of 36 and 48c a ton.

•

SABINA, OHIO: Achor's Quarry, New Vienna, has been awarded a contract for 1140 tons of stone for repair of county roads at a cost of 95c a ton. Clyde C. Beam Co., Inc., Sligo, also has been awarded a contract for 5050 tons at 65c a ton.

•

KNOXVILLE, TENN.: Tennessee Valley Sand & Gravel Co., Sheffield, Ala., has contracted to furnish up to 15,000 tons of silica gravel from Spruce Pine, Ala., for use at the TVA fertilizer works at Muscle Shoals for a unit price of 60c a ton.

•

TIFFIN, OHIO: Baumgardner Products Co., Tiffin, has been awarded a contract for 436 tons of concrete sand at $1.40 a ton delivered to be used in the construction of a bridge.

•

FARMINGTON, MINN.: Mr. V. Hinz and Co., will operate the limestone crusher located 1½ miles northeast of New Trier, Minn., and deliver limestone to any farm for a cost of $1.75 within a five-mile radius of the quarry. The cost for longer hauls will be proportionately higher.

•

WINCHESTER, IND.: Randolph county commissioners have awarded the following gravel contracts: R. E. Hines, Nottingham pit, 41c per cu. yd.; R. E. Hines, Harris pit, 41½c; H. W. Clendenin, Cougill pit, 44c; Earl Skinner, Clark pit, 43c; Lawrence Pugh, Warstler pit, 42c; Lawrence Pugh, Pugh pit, 45c; William Minch, Harter pit, 41c. The commissioners also accepted bids for gravel at the Morris and Gable pits in Stoney Creek township at 8 and 15c per cu. yd. respectively.

•

MUNCIE, IND.: The board of county commissioners awarded contracts for gravel for use on the county highways as follows: Charles Hamilton at 25c per cu. yd., and Robert T. Wright and S. M. Peterson, both in Niles township and each at 15c per cu. yd. for gravel in the bank.

•

OTTUMWA, IA.: The Rabitz quarry has been contracted by the county board of supervisors to furnish agricultural limestone at 99c a ton at the quarry.

•

NEW YORK, N. Y.: United Gypsum Co. received the order for 30,000 tons of gypsum plaster for the Metropolitan Life Insurance Co.'s $50,000,000 housing development at a price of $8.50 a ton.

•

NORTH BEND, NEB.: Annual county gravel contracts have been awarded. The localities where the material is to be delivered and the price per cu. yd. delivered is as follows: William Lux, to Union township 46c, Pleasant Valley 69c, Webster 92c, Cotterell 46c, Ridgeley 69c, Pebble 97c, and city of North Bend 39c; I. S. Eager, to Platte east 49½c, Nickerson 58c, Hooper 73½c, Logan 94c, Elkhorn 57½c, Fremont 48½; and Orshek and Christensen, to Platte west 54c, Maple 74c, Everette 94c and Cuming 108c.

•

MIDLAND, MICH.: The city council has awarded R. J. Fisher Sand & Gravel Co. a contract for 4000 cu. yd. of base course gravel at $1.23 per cu. yd., and 3450 cu. yd. of stabilized gravel at $2.15 per cu. yd. for use in its street improvement program.

Recent Equipment Purchases

SCREEN EQUIPMENT CO., Buffalo, N. Y., has announced the following recent purchases of Seco screens:

THE GENESEE SAND & GRAVEL CO., Bowmansville, N. Y., has added a new double-deck screen to its plant equipment.

THE GREENFIELD MASSACHUSETTS BROKEN STONE CO., is installing a 5- x 10-ft. three-deck screen.

JEFFERSON COUNTY STONE CO., Louisville, Kentucky, a new company in the crushed stone field, is installing a 3- x 16-ft. double-deck screen.

DOLOMITE PRODUCTS CO., Rochester, N. Y., has installed a 4- x 10-ft. double-deck screen in its Buffalo Road plant.

VIRGINIA FELDSPAR CO., Bedford, Va., has installed a 3- x 10-ft. double-deck screen.

T. J. QUINN & SON of Ashton, Rhode Island, are now placing in service a 4- x 8-ft. four-deck screen.

STANDARD SLAG CO. has installed a 4- x 10-ft. screen in its Wierton, W. Va., plant.

•

STEARNS MANUFACTURING CO., Adrian, Mich., reports the following recent installations of concrete block machinery:

HARRISBURG BUILDING UNITS, INC., Harrisburg, Penn., has added a second model 9 Joltcrete machine.

BADGER CONCRETE CO., Oshkosh, Wis., has installed a model 9 Joltcrete.

CINDER CONCRETE PRODUCTS, INC., Denver, Colo., has added a model 9 Joltcrete.

Made of Acid Open Hearth Steel Wire

Round Strand
Flattened Strand
Preformed
Steel Clad
Non-Rotating

The Service Record of this wire rope continues to make and hold friends.

MADE ONLY BY

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Established 1857

5909 Kennerly Avenue St. Louis, Mo.
New York — Chicago — Denver
San Francisco — Portland — Seattle

Perforated
METAL SCREENS
ANY SIZE - ANY SHAPE
ANY METAL - ANY PERFORATION
H & K screens are produced to meet the most exacting specification and to serve well and long. Quality and workmanship are given first consideration.
Write for catalog!
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5650 Fillmore St., Chicago—114 Liberty St., N. Y.

They're Sure-fire Cost-cutters

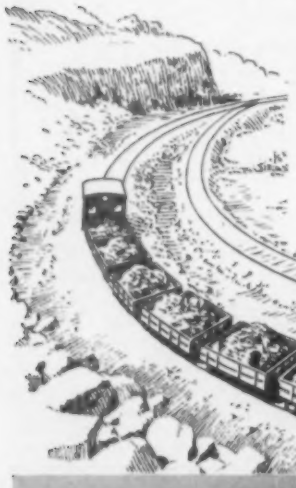
43-ton, 300-hp, diesel-electric locomotive

NEW SMALL DIESEL-ELECTRICS

THEY save money in fuel and maintenance costs. They reduce wear on cars and track because they run smoothly. They are easy to handle because of the simple electrical control. They are available for work most of the time. And now you can get them at the lowest prices in diesel-electric history.

General Electric has built a large number of these locomotives in the larger sizes for both railroad and industrial switching work, and the operating data obtained show that in most cases they pay for themselves in a remarkably short time.

Why not investigate the savings possible in hauling or switching work with our small-size diesel-electrics. Call the nearest G-E office and one of our representatives will be glad to talk this over with you. General Electric, Schenectady, N. Y.



SMALL-SIZE DIESEL-ELECTRICS AT WORK

Nine G-E 23-ton locomotives are now operating in three Midwestern cement plants. The smooth torque they exert on the wheels makes possible starting heavy loads at the bottom of the quarries

GENERAL ELECTRIC

250-37

Convert Lime Plant from Coal to Natural Gas

THE INNERKIP LIME & STONE CO., LTD., located at Beachville, Ontario, Canada, has converted its lime plant from coal to natural gas fired. Gas is brought from the Brownsville field, 14 miles south of Beachville, and is delivered to the plant through a 4-in. pipe line under about 75-lb. pressure. This pressure is reduced to 4 p.s.i. before the gas enters the burners, moisture being added through a jet attached to the burners. The burners were supplied by the James Steward Manufacturing Co., Ltd., Woodstock, Ontario. The lime plant consists of five Arnold and Weigel vertical kilns, which were formerly stoker-fired. Very little alteration was required to install the natural gas burners. The resultant lime product has been considerably improved, especially for the chemical industry, according to C. E. Downing, manager. Gas is supplied by the Southern Ontario Gas Co., and runs about 1100 B.t.u., with a mere trace of sulphur. This is believed to be the first plant in Canada fired with natural gas, and the installation is said to be working to the entire satisfaction of the management.

Illinois Crushed Stone Operators to Organize

AT A MEETING on April 7 at the Abraham Lincoln Hotel, Springfield, Ill., fourteen representatives of crushed stone producers in Illinois met to form a permanent organization. Plans are under consideration to employ a full-time secretary and establish an office. A committee consisting of Geo. Hammerschmidt of the Elmhurst-Chicago Stone Co., W. N. Carter, National Stone Co., Joliet, Ill., and Dan Sanborn, Lehigh Stone Co., Lehigh, Ill., has been commissioned to draw up a plan of organization. The meeting was called by E. J. Krause of the Columbia Quarry Co., St. Louis, Mo. Those in attendance included: Norman E. Kelb and H. M. Hollingshead of the Ohio-Indiana Stone Co., Indianapolis, Ind.; C. F. Meyer, Jr., Midwest Rock Products Corp., Indianapolis, Ind.; Dan Sanborn, Lehigh Stone Co., Kankakee, Ill.; W. N. Carter, National Stone Co., Joliet, Ill.; George Hammerschmidt and W. W. Traver, Elmhurst-Chicago Stone Co., Elmhurst, Ill.; Ralph E. McLean and Morris E. McLean, East St. Louis Stone Co., East St. Louis, Ill.; E. J. Krause, E. H. Bills and J. B. LeBarge, Columbia Quarry Co., St. Louis, Mo.; Harry Clark, Consumers Co., Chicago, Ill.; and Larry Fay, Material Service Corp., Chicago, and guests, S. A. Phillips, Pit and Quarry; and R. S. Torgerson, Rock Products, Chicago.

Building Upturn

DUN & BRADSTREET report an increase of 55 percent in building permits for 215 cities in March, 1939, over the same month a year ago. Sales of building supply companies have shown an increase of 20 percent, according to a report in *Wall Street Journal.*

Moving Cement Mill Machinery to Texas

TRINITY PORTLAND CEMENT CO., Dallas, Texas, has taken over the old plant of the American Portland Cement Co. at Foreman, Ark., and will dismantle it. Four pieces of equipment, including the kiln, two mills and the cooler, will be moved to the Trinity plant at Dallas.

Specifications for Gypsum Plastering and Lathing

THE AMERICAN STANDARDS ASSOCIATION, New York, N. Y., has approved the Standard Specifications for Gypsum Plastering, Including Requirements for Lathing and Furring, developed by sectional committee A-42 on specifications for plastering. Materials used for gypsum plastering and lathing are required to meet the requirements of seven designated A.S.T.M. standard specifications, including the tentative specifications for sand for use in plaster (C35-36T) which are appended to the standard.

Baltimore Sand and Gravel Company Improvements

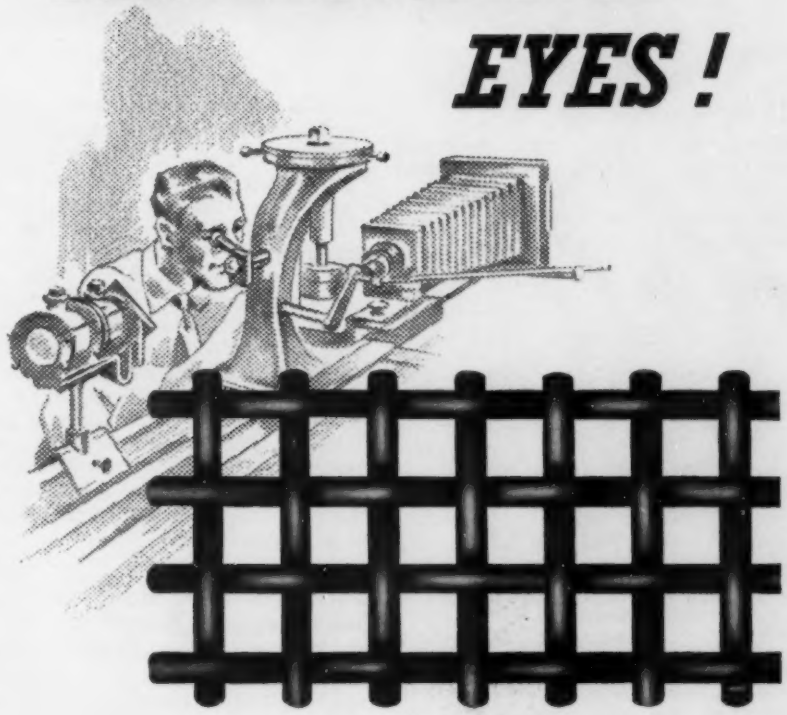
ARUNDEL CORPORATION, Baltimore, Md., has installed a 5- x 24-ft. revolving gravel washing screen made by Smith Engineering Works. In addition to this improvement two crushed stone plants are being redesigned and re-equipped. The following equipment was furnished by Smith Engineering Works for these plants: two 10B breakers, a 36-in. gyrasphere, a 4- x 10-ft. single-deck pulsator, a 3- x 8-ft. single-deck pulsator, and a 4 x 10-ft. triple-deck pulsator.

Labor Protests Use of Foreign Cement

AN INVESTIGATION has been under way by the A. F. of L. into the use of foreign portland cement on public works projects in Texas. Conferences have been held with officials of the Texas Highway Department and the State Board of Control. Over $20,000 in cement has been purchased by the state departments from foreign countries, chiefly Belgium and Germany. Bids quoting foreign cement have ranged from $2.04 to $2.97 per bbl. as compared with bids quoting American cement which ranged between $2.14 and $3.235.

WE'LL NEVER SATISFY THESE

RESEARCHING EYES!



"NEVER let *well-enough* alone" is the policy of the Roebling Research Laboratory. It is the business of our research men to be eternally dissatisfied. Their job is not to tell us how good our product is — but to discover, if possible, how we can make it better.

When you buy Roebling Screening you have the assurance that it is the result of constant research — in one of the country's most modern and completely equipped industrial research units.

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Branches in Principal Cities

ROEBLING ABRASO SCREEN

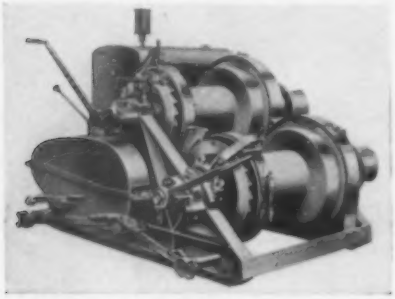
TRADE JERSEY MARK

90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

NEW MACHINERY AND EQUIPMENT

Three-speed Hoist

CLYDE IRON WORKS, INC., Duluth, Minn., has developed a gasoline-engine operated hoist that has three speeds available on both drums. Variation of speeds and loads is obtained through a clutch



Hoist having three working speeds available on both drums

and gear shift. For heavy work, there is available a 7500-lb. single line pull at 200 f.p.m.; for medium work, 4200 lb. on a single line at 350 f.p.m.; for high speed work, 2500 lb. on a single line at 600 f.p.m. Power is obtained through an 85 hp. "V-8" industrial type gasoline engine. The complete unit is built on the skid-type, one-piece, all-steel frame.

Acquire Excavator Rights

BUCYRUS-ERIE CO., South Milwaukee, Wis., has the exclusive manufacturing rights to the Ruth dredger, which will now be known as the Bucyrus-Ruth excavator. This equipment has been used extensively on irrigation systems both for construction and maintenance,

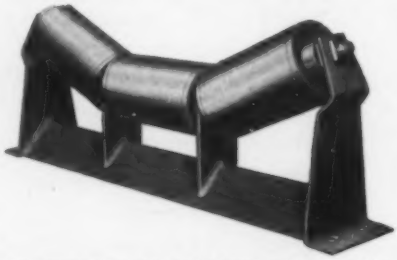
Excavator which may be adaptable for sand and clay pit operations

but it is also believed to have possibilities for use in sand and clay pit excavation.

The digging unit is a chain of buckets supported on a digging ladder, which can be swung to either side for digging or directly to the rear for traveling from job to job. It can be moved up and down and sideways while working. As a result, the operator can accurately maintain the depth and ditch contour, even when the path over which the machine is moving varies in elevation or alignment. This excavator can straddle a ditch or can work with both tracks on one bank. The telescoping frame makes it possible to adjust the excavator to ditches of different widths while moving.

Conveyor Idler Has Self-Cleaning Base

THE PIONEER ENGINEERING WORKS, Minneapolis, Minn., announces an improved troughing idler for belt conveyors. Among the features claimed are: a self-



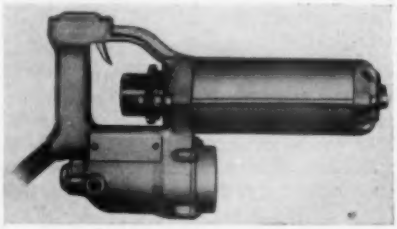
Conveyor idler with self-cleaning base, welded construction, replaceable rolls, and simplified lubrication

cleaning base, welded construction, replaceable rolls, and simplified lubrication.

The base angle is laid with the open side down and the corner up, which prevents any dirt or gravel from piling up under the roller. Uprights are welded to the base and the ends are pressed steel, which gives rigid construction, light weight, and neat appearance. The rolls are made of welded tubing with cast iron ends pressed in place. The bearings are protected with labyrinth seals that keep the dirt out and the grease in. It is only necessary to grease one end of this idler as the center shaft carries the grease to all bearings.

Lightweight Electric Hammer

THE SYNTRON CO., Homer City, Penn., has placed on the market a lightweight electric hammer for heavy construction drilling and cutting. It is designed for operation on 110-volt, a.-c. circuits, and is 16 in. overall, 3½ in. in diameter, and weighs 25 lb. Using star drills, it is said that holes up to 2 in. in diameter can be drilled in the hard-



Electric hammer for heavy construction drilling and cutting

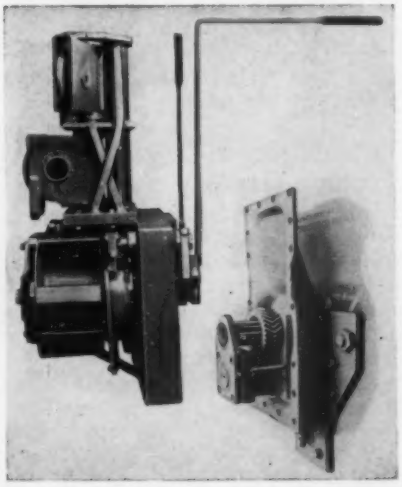
est concrete. The hammer uses the standard Syntron design, consisting of two magnets wound around a barrel in which is a free moving, heavy piston that strikes directly on the shank of the tool being used.

It has a small, high speed blower motor in the handle, which is said to keep the magnet windings cool.

Power Control Unit for Tractors

R. G. LETOURNEAU, INC., of Peoria, Ill., and Stockton, Calif., has announced a new power control unit, Model T, for use with tractors.

It is said to have the following advantages: (1) an interchangeable neck and gear case, (2) interchangeable drums of varying cable lengths, (3) a new brake assembly, using Timken bearings, that takes the play and slack out of the brake and gives the operator a more

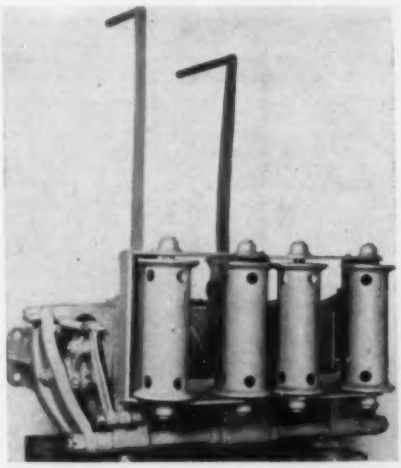


Power control unit with interchangeable neck and gear case for use with tractors

accurate hair-trigger control, (4) interchangeable reduction gear sets for the neck — to regulate and control line speeds, (5) an improved brake and clutch assembly that automatically eliminates all brake-drag when the clutch is engaged, (6) "Velvetouch" brake lining for longer wearing, smoother operation, (7) controlled lubrication through a new oil ring, and (8) herringbone gears at vital points for greater power and strength.

Cable Control for Tractor Auxiliary Equipment

CATERPILLAR TRACTOR CO., Peoria, Ill., has designed a double-drum cable control for operation of earth-moving equipment from a track-type tractor. The mounting of the control unit leaves the tractor drawbar clear, making it easy to hook and unhook equipment, and also allows the operator an unobstructed view to the rear. It is claimed that better spooling is provided by increasing the distance between the drum and the first bend in the cable. The levers to engage the clutches are conveniently located within easy reach of the operator. Fairlead rolls are adjustable to higher or lower positions and provided with removable bushings and pressure gun grease fittings.



Double drum cable control attachment permits tractor operator to control scrapers, bulldozers and other equipment with minimum of effort

Pocket Kit Provides Snake Bite Treatment

DAVIS EMERGENCY EQUIPMENT CO., New York, N. Y., has brought out a new pocket snake bite kit for the use of workers who must enter snake-infested regions. This kit, which can be easily carried in a vest pocket, contains the following equipment: a tourniquet, which is applied to arm or leg immediately above the wound to prevent the spread of poison through the body; a stainless steel lancet for opening up the fang holes to permit drainage of the poison; a syringe, which is used for pumping blood and venom from the wound; and also antiseptics, bandages, and ammonia inhalants for use if victim becomes faint.

Renewable Lip Dipper

AMERICAN MANGANESE STEEL DIVISION of The American Brake Shoe & Foundry Co., Chicago Heights, Ill., has announced that power shovel dippers made in ¾ to 18-cu. yd. capacities, are now available with a two-piece body.

Back and sides form one section, and the front is riveted on and can be readily removed and replaced. The lips

Shovel dipper with two-piece body and with renewable lips

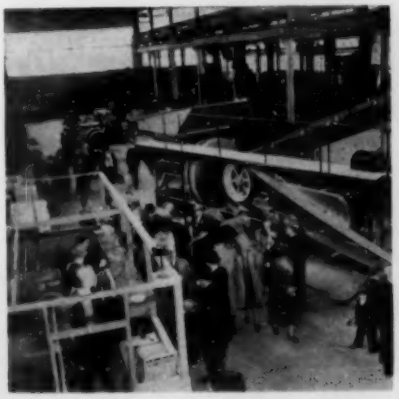
are keyed into and "U" bolted to the body sections as in previous types, and can also be replaced.

Different teeth for digging in various types of materials are available; they, too, are keyed into and secured to the lips.

Portable Crushing and Screening Plant

SMITH ENGINEERING WORKS, Milwaukee, Wis., has brought out a portable crushing, screening, and loading plant. To demonstrate this equipment and other machinery, the company held "open house" at the plant on April 14, 15, and 16.

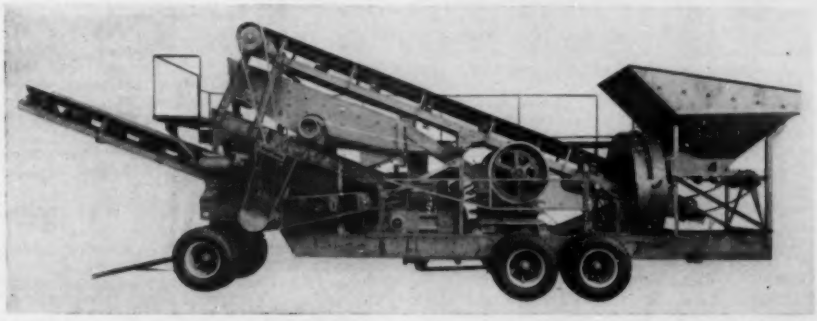
This recently developed machine is known as the Telsmith No. 9A, dual portable plant. It has a feed hopper for shovel or crane loading which has a capacity of 2½-cu. yd., and over the hopper is a wedge bar grizzly with 7-in. openings. Material from the hopper is fed by a reciprocating plate



Inspecting portable crushing and screening plant at "open house"

feeder to a lifting drum, 72 in. in diameter, equipped with lifting blades which place it on the 24-in. main feed conveyor, 24 ft. 3-in. centers, leading to the 3- x 10-ft. Telsmith vibrating screen with 2½ decks. The screen is operated with a 6-in. flat belt drive of 4-ply Sagamore belting.

Oversize from one deck is chuted to a 9- x 36-in. Telsmith-Wheeling jaw crusher with flat belt drive from the power unit, and from another deck it is passed to a 30-in. dia. x 18-in. wide Telsmith roll crusher. Throughs are returned by conveyor to the lifting drum and recirculated. The finished material conveyor for truck loading is 24-in. wide, 18-ft. centers. The finished material hopper has 2½-cu. yd. capacity. Sand is rejected by means of an 18-in. conveyor, 7-ft. 3-in. centers. All conveyors are V-belt driven. The power unit may be either a 95-hp. Diesel engine or a 120-hp. gasoline engine. Total weight of the plant is 50,000 lb. with a wheel load of 4375 lb. maximum per wheel. The capacity of the plant is from 100 to 125 cu. yd. per hr. of ¾-in. gravel with 25 percent to be crushed.



Crushing and screening plant has reciprocating feeder and lifting drum to reduce overall length

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of April 8:

Central

57196. Establish on **slag, granulated** (light weight concrete aggregate), C. L. (See Note 3), Chicago, Ill., and points in Chicago switching district as defined in Agt. Sperry's Tariff 20-V, as amended or reissued, to Batesville, 220c; Bloomington, 194c; Evansville, 220c; Ft. Wayne, 176c; Frankfort, 160c; Indianapolis, 185c; Lafayette, 160c; Muncie, 185c; Decatur, 185c; South Bend, Ind., 148c; Adrian, 211c; Battle Creek, 207c; Bay City, 264c; Detroit, 220c; Flint, 246c; Grand Rapids, 211c; Kalamazoo, 198c; Lansing, Mich., 211c; Cincinnati, 220c; Cleveland, 278c; Lima, 211c; Springfield, 229c; Toledo, O., 211c per net ton.

57215 (1). Cancel Items 9260 to 9271, incl., Items 9370 to 9381, Inc., and Items 9390 to 9395, incl., of C. C. C. & St. L. Ry. Tariff 525-S, publishing proportional rates on **rock phosphate**, crude, ground (not acidulated), in bulk, bags or barrels, or lump in bulk, C. L., min. wt. 44,800 lb., Ohio River crossings, viz., Cincinnati, O., Jeffersonville, Ind., and Louisville, Ky., respectively, to various points in C. F. A. territory, and similar items in other individual lines' tariffs. Classn. basis to apply.

57275. Establish on **limestone**, agricultural and screenings, unburned, in bulk in open top cars only, C. L., McVittys, O., to Geauga Lake and Oneida, O., 138c per net ton.

57390. Establish on **limestone**, agricultural and screenings, unburned, in bulk in open top cars only, C. L. (See Note 3); also on agricultural limestone, unburnt, agricultural limestone meal or agricultural limestone screenings in box cars, min. wt. 50,000 lbs., McVittys, O., to Cumberland, O., 160c for open top equipment and 165c per net ton for box car equipment, via C. C. C. & St. L. Ry., Columbus, O., B. & O. R. R.

57391. Establish on **stone**, fluxing, furnace or foundry, melting or refractory, unburnt, in bulk, C. L. (See Note 3), Maple Grove, O., to Toledo, O., 61c per net ton.

57392. Establish on **ground or pulverized limestone**, in bulk, or in bulk in bags, straight or mixed C. L., min. wt. 60,000 lbs., Bloomington, Ind., to Terre Haute, Ind., 143c; Marysville, Mich., 292c; Hamilton, O., 176c; Miamisburg, Middletown, O., 187c; Wooster, O., 259c; Jeanette, Penn., 314c per net ton.

57412. Establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lbs., Speed, Ind., to Indianapolis, Ind., 149c per net ton.

57476. Establish on **crushed slag** or **crushed commercial slag** (other than granulated), in open top cars, C. L., Hamilton, O., to Lancaster, O., 127c per net ton.

57477. Establish on **crushed limestone**, C. L., from Bedford-Bloomington, Ind., district to Ottawa, Ill., 219c per net ton via C. I. & L. Ry., LaFayette, Ind., Wab. Ry., Streator, Ill., C. B. & Q. R. R., and via C. I. & L. Ry., Shelby, Ind., N. Y. C. R. R., Streator, Ill., C. B. & Q. R. R.

57493. Establish on **sand, all kinds, and gravel**, in open top cars, C. L., Overpeck, O., to Pomeroy, O., 171c per net ton.

57432 (2). Establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lbs.Proposed rates (in cents per net ton) from Gibsonburg, O.

To. (Rep.)	(N. W. Ohio Group) Proposed	Marble Cliff, O. Proposed
Lockwood, Ky.	226	182
Rock Branch, Ky.	248	193
Offutt, Ky.	248	204
Sublett, Ky.	259	215
VanLear Jct., Ky.	259	204
Martin, Ky.	270	215
Clear Creek, Ky.	270	226
Wheelwright, Ky.	281	226
Dinwood, Ky.	270	215
Wayland, Ky.	270	226
Allen, Ky.	259	215
Island Creek, Ky.	270	226
Dorton, Ky.	281	237
Dunham, Ky.	292	248
Sutton, Ky.	281	226
Greasy Creek, Ky.	281	237
Elkhorn City, Ky.	281	237

57451. Establish on (a) **sand** (except industrial) in closed equipment, C. L.; (b) sand (except industrial), in open top equipment, C. L. (see Note), to Elkins, W. Va., from Vassar group, viz.: Vassar, Wampson, McHale, Juniata and Watrousville, Mich., 341c and from Muskegon groups, viz.: Muskegon, Grand Haven and Rosy Mound, Mich., 363c per net ton.

Note—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

57515. Correct min. wts. as published in B. & L. E. R. R. Tariffs I. C. C. 1023, 1100, 1106, 1125 and 1128, applicable on following commodities in open top cars, viz.: (a) **Crushed stone and screenings; crushed stone**, coated with oil, tar or asphaltum; **limestone**, crude cement; **stone**, fluxing, also rip rap, spawls, etc.; **gravel**; **sand** (except industrial); **sand**, viz., industrial; **sand**, burnt or refuse foundry; **sand**, refuse or spent, grinding; (a) **stone**, breakwater or filling; **refuse, limestone screenings**; from stations on B. & L. E. R. R. to pts. in C. F. A., T. L. A., N. E. F. A. territories and Canada, by addition of the following to present min. wt. "Orders will not be accepted for cars of less marked capacity than 80,000 lb."

57516. Establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., Woodville, Gibsonburg, Maple Grove, O. (also other northwestern Ohio Group 1 origins, if desired), to St. Louis, Mo., and East St. Louis, Ill., 314c per net ton.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason: No present or prospective movement.

57543 (2). Establish on **lime**, common hydrated, quick or slaked, C. L., Detroit, Mich., to Marietta, O., 18c, min. wt. 30,000 lb., and 14c, min. wt. 50,000 lb.

57559. Establish on **crushed commercial slag** (product of iron or steel blast or open hearth furnaces) (not including granulated slag), in open top cars, C. L., Cleveland, O., to Detroit, Mich., 149c per net ton.

Trunk

M-3918. **Syenite, nepheline**, crude, C. L. min. wt. 100,000 lb., except when cars are loaded to full visible capacity and will not contain this min. actual wt. will apply, but not less than 60,000 lb. from Lakefield, Ont., to Genesee Dock, N. Y., 8c per 100 lb. in lieu of present rate of 10c per 100 lb.

Sup. 3 to 37324. **Crude gypsum rock**, C. L., (See Note 3), from Chester and Philadelphia, Penn., to Howes Cave, N. Y., $2.42 per net ton.

Sup. 3 to 37484 (cancels Sup. 2). **Slag, crude or granulated**, C. L. (product of iron and steel furnaces), in open top cars (See Note 3), from Niagara Falls and Buffalo, N. Y., to Dover and Manville, N. J., $2.64 per net ton, to Alexandria, Ind., $2.26, and from Pittsburgh, Bessemer, South Duquesne, Munhall and Mifflin Jct., Penn., to Manville, N. J., $2.64 per net ton.

Sup. 1 to 37354. **Lime, fluxing**, not ground, in bulk, C. L., min. wt. 70,000 lb., from Engle, Martinsburg, Millville, W. Va., Stephens City, Orando, Capon Road and Strasburg Jct., Va., to Ivy Rock, Conshohocken and Swedeland, Penn., $2.20 per net ton in lieu of present sixth class to Ivy Rock and present $2.42 per net ton to Conshohocken and Swedeland.

37532. **Fluxing Lime**, having no commermercial value for building or chemical purposes, C. L., min. wt. 60,000 lbs., to Braeburn, Penn. Proposed rates net ton: From Berkeley, W. Va., $2.10; Martinsburg, W. Va., $2.10; Fountain Rock, Md., $2.10; Frederick, Md., $2.10; Woodsboro, Md., $2.10; Campbell (York Co.), Penn., $2.10; Hellam, Penn., $2.10; York, Penn., $2.10; Chemical, Penn., $2.10; Pleasant Gap, Penn., $2.10; Bellefonte, Penn., $2.10; Cockeysville, Md., $2.75; Texas, Md., $2.75; Ashcom, Penn., $2.10. Reason—Comparable with rates to other points in immediate vicinity. Sup. 1, from Martinsburg and Engle, W. Va., to Bruehurn, Penn., $2.10 per net ton, in lieu of current rate of $2.64 per net ton. Sup. 2, from Annville, Penn., to Braeburn, Penn., $2.31 per net ton. Sup 3, from Thomasville, Bittinger and York, Penn., to Braeburn, Penn., $2.10 per net ton.

37551. **Sand** (other than industrial), in open top cars, without tarpaulin or other protective covering, C. L. (See Note 3), from Dunfee, W. Va., to Whitby, W. Va., 99c per net ton, in lieu of current combination rate of $1.43 per net ton.

37584 (increase). Cancel rates on **moulding sand**, C. L., from Cassity, W. Va., to stations on B. & O. R. R. in Maryland and West Virginia, as published in B. & O. R. R. Tariff I. C. C. 22655. (See Note 4.)

37585. **Sand**, moulding (naturally bonded), C. L., from Albany, Catskill, Green Island, Schenectady, Troy, Voorheesville, N. Y., and other points in immediate vicinity, to Middle River, Md., $2.75 per net ton, in lieu of current sixth class rates.

37591. **Crushed stone**, C. L. (See Note 3), from White Haven, Penn., to Port Jervis, N. Y., $1.54 per net ton on uncoated stone and $1.68 per net ton on coated stone, in lieu of current rates of $1.76 and $1.87 per net ton respectively.

37594 (increase). Cancel rate of 13c per 100 lb. on **limestone, ground agricultural**, C. L. (See Note 3), from Cambria, N. Y., to Chippawa, Ont.; also cancel proportional rate of 10½c per 100 lb. applying on traffic destined to points on the Niagara Falls Park & River Ry. (See Note 4.)

37623. Cancel rate of 50c per net ton on **crushed stone**, C. L., min. wt. (See Note 3),

from Millville, W. Va., to Northern West Virginia Power Co.'s Siding, W. Va., as published in B. & O. R. R. Tariff I. C. C. No. 23158. Switching rate of $11.00 per car to apply (See Note 4).

37617. **Ground limestone**, C. L., min. wt. 60,000 lb.:

To	(1)	(2)	(3)
Montreal, Que.	643	676	687
Granby, Que.	643	676	687
Sherbrooke, Que.	714	747	758
Quebec, Que.	823	856	867
Windsor, Ont.	440	440	440

(1) From Rambo, Penn.; (2) From York, Penn.; (3) From Texas and Cockeysville, Md. Rates in cents per net ton. Reason: Comparable with rates from and to other points.

Southern

18621. **Gypsum sand** (refuse or byproduct from the manufacture of superphosphate), C. L. Establish 375c net ton. East Tampa, Fla., to Birmingham, Boyles, North Birmingham and Phoenixville, Ala.

18684. **Slag**, C. L. Established 372c net ton from Birmingham, Ala., and group (Item 495 of S. W. L. 114-H), to Temple, Tex.

18785. Cancel proportional rate of 230c (253c including increase) net ton on **slag**, C. L. from Birmingham district points to New Orleans, La., published on page 878 of SFTB Tariff 392-A, also similar rates published by individual lines or tariff publishing agents, permitting local rates to apply.

18803. **Limestone** or **marble**, ground or pulverized, C. L., min. 60,000 lb. Establish 525c net ton. Tate and Whitestone, Ga., to East Canton, O.

18805. **Limestone** or **marble**, ground or pulverized, C. L., min. 60,000 lb. Establish 525c from Cartersville, Ga., and 517c net ton from Sparta, Tenn., to East Canton, O.

Southwestern

15718. **Lime**, Neosho, Pierce City, Sequiota and Springfield, Mo., also Johnsons, Ark., to Memphis, Tenn. To reestablish rate of 15c per 100 lb., min. wt. 30,000 lb., from Neosho, Mo., Pierce City, Mo., Sequiota, Mo., and Springfield, Mo., also Johnsons, Ark., to Memphis, Tenn., on lime (calcium), viz.: Common lime, including magnesium lime, hydrated, quick or slaked C. L., in S. W. L. Tariff 227-A, I. C. C. 2825.

15994. **Lime**. To establish rates on lime, C. L., from Limedale Spur, Ark., to Wyoming stations on the same scales as published in W. T. L. Tariff No. 368 from Springfield, Mo., to Wyoming stations located in Groups 4117 to 4237, inclusive, W. T. L. Territorial Directory No. 5-A.

16315. **Sand and gravel**, Neame, La., to K. C. S. stations Beaumont to West Port Arthur, Tex., incl. To establish the following rates on sand and gravel C. L., from Neame, La., to K. C. S. stations in South Texas, Beaumont to West Port Arthur, Tex., inclusive. Beaumont, Chaison, 80c. Higgins, Garrison Siding, Zummo, Dowling, Sun, Smiths Bluff, Nederland, Magpetco, Rice Farm, Port Neches, Griffing, Del Mar, Port Arthur, Atreco, West Port Arthur, 90c.

16374. **Sand**, McKenzie, Tenn., to Pine Bluff, Ark. To establish rate of $2.27 per ton of 2,000 lb. on sand, C. L., from McKenzie, Tenn., to Pine Bluff, Ark.

16370. **Gypsum rock**, Bucher and Watonga, Okla., to Fort Worth, Dallas and Atco, Tex. To establish rates on gypsum rock C. L., min. wt. 100,000 lb., except when cars are loaded to actual visible capacity actual wt. shall govern, but not less than 90,000 lb., from Bucher and Watonga, Okla., to Fort Worth, Tex., $2.20; to Dallas, Tex., $2.40 and to Atco, Tex., $2.85 per ton of 2,000 lb.

16381. **Gypsum rock**, Bucher, Okla., to Leeds, Ala. Establish rate of $4.45 per net ton on gypsum rock, C. L., min. wt. 100,000 lb., except when shipment is loaded to full visible capacity of the car actual wt. will apply, but not less than 90,000 lb. from Bucher, Okla., to Leeds, Ala.

Southern Ports

Sup. 1 to S. P. F. F. C. Dkt. 2301. Commodity description, **crude phosphate rock**, C. L., in open top cars only, min. wt. 100,000 lb., from Gulf ports, shipside, to Quincy, Ill. Present rate—$7 per ton of 2,000 lb. Proposed rate—$4.70 per ton of 2,000 lb.

Texas-Louisiana

2849-B. To establish rate of 76c per ton of 2,000 lb. on **sand**, C. L., from Corrigan, Tex., to Houston, Tex., subject to following restrictions published on page 2 of Texas Lines' Tariff No. 84-A; also with provision that if and when the present 56c sand rate from Urbana to Houston is increased under Application 3023, same percentage increase to apply from Corrigan.

(5) Rates from intermediate origins not to be higher, otherwise exception to General Rule 8 of the Railroad Commission of Texas. (11) Switching charges of lines other than line haul carrier at destination will not be absorbed, but will be in addition to the rate provided herein, and paid by shipper or consignee. (15) Rate applies only to the destination station proper and will not apply to other points taking same rates.

3386. Shipper's proposal to establish the following rates on **washed gravel and crushed stone** C. L., suitable only for the construction of concrete pavement to Houston, Texas. On gravel: From Dolman and Klimek, 66c per ton; from Leevan, 81c per ton. On **crushed stone** from Dittlinger, Ogden and New Braunfels, $1.06½ per ton. Reduce standard rates from other origins 26c per ton on request. Restrict the use of such commodities to the pavement of city streets.

3407. To establish rate of 40c per ton on **sand and gravel**, C. L. (See Note 2), except when actual weight of the car loaded to full space capacity is less than 90 percent of the marked capacity, such actual weight shall be used, from Texand to Marlin. Same reduction of 28c per ton to be established from other producing points on request.

New England

46159. 1110-4 (2-R)—**Aplite rock**, crushed or ground, C. L., min. wt. 60,000 lb., within and from New England territory to Trunk Line and Central Freight Association territories, including points in Extended Zone C in Wisconsin. Present—Sixth class, min. wt. 50,000 lb., as per Item 16, page 346, C. F. C. 12. Proposed—Class 21.

46420. **Limestone**, broken, crushed, ground or pulverized, min. wt. 60,000 lb., West Rutland, Vt., to Pittsburgh, Penn., present, sixth class; proposed per net ton, $4.13. West Rutland, Vt., to Tiffin, O., present, sixth class; proposed per net ton, standard $4.46, differential, $4.26. Reason: Same basis as applicable from other New England pts.

46475. **Common sand and gravel**, min. wt. 50 net tons of 2000 lb., except when cars of lower capacity are furnished for carrier's convenience the min. wt. will be the marked capacity of car, Farmington to Portsmouth, N. H. Present, sand 77, gravel 88 per net ton; proposed, 50 per net ton. Reason: To enable the B. & M. R. R. to receive a haul on this material.

46504. To cancel rate of 22c on **ground feldspar and ground syenite** from Keene, N. H., to Trenton, N. J., as published in Item 425-A of B. & M. I. C. C. A-2960, permitting Class 21 rate of 20c, min. wt. 60,000 lb., as per Agent Doe's I. C. C. 160 and 316 to apply. Reason—To permit application of same basis from Keene, N. H., as applies generally through O. C. territory.

46511. **Lime**, common, hydrated, quick or slaked, min. wt. 50,000 lb., Fonda Jct., Vt., to Fostoria and Massillon, O. Present—38c. Proposed—455c and 464c net ton, respectively. Reason—To place shipper at Fonda Junction on relative basis with other Eastern producers.

46519 (1-R). **Crushed stone**, min. wt. 50 net tons, except when cars of lower capacity are furnished for carrier's convenience the C. L. min. wt. will be the marked capacity of the car, Greenfield, Mass., to Groveton, N. H. Present—165c net ton as per B. & M. I. C. C. A-2965. Proposed—145c net ton. Reason—To enable the B. & M. to receive a haul on this material.

46797. **Sand and gravel**, Kendall Green to Ayer, Mass. Present—77c net ton (per B. & M. I. C. C. A-2965). Proposed—$30 per car. Cars must not be loaded over the market load limit. Where cars are weighed at the request of the shipper or consignee, there will be an additional weighing charge of $1.49 per car. Reason—To enable the B. & M. to receive a haul on this material.

Illinois

I. R. C. 7100-407. **Gravel and crushed stone**, in open top cars C. L. from Lehigh, Peoria, Pekin and Bloomington, Ill., and other producing points reaching the destinations on single line basis of rates as interested carriers may direct. (Reduction in present single line rates from Kern, Ind., and Attica, Ind., also involved. To Champaign and Urbana, Ill. Min. wt.—Generally (See Note 2). Proposed rates or charge—Proposed reduction of 12c in existing single line rates which would result in the following rates:

From	Present Rates	Proposed Rates
Lehigh, Ill	88	76†
Peoria, Ill.	92	80
Pekin, Ill.	92	80
Bloomington, Ill.	84	72
*Kern, Ind.	77	65
*Attica, Ind.	77	65

* Shown as information. † Via N. Y. C.

8615. **Sand and gravel**, C. L., from Chillicothe, Ill., to Decatur, Ill. (Dec. 1, 1938). Present—$1.29 net ton. Proposed 97c net ton.

8659. (I. R. C.) **Crushed stone and sand.** (See Note 3). Crushed stone from Falling Springs to Mitchell, Ill., and Poag, Ill.; Present—69. Proposed—39. **Crushed stone** from Krause, Ill., to Mitchell, Ill., and Poag, Ill.: Present—80. Proposed—50. **Sand** from E. St. Louis, Ill., and Poag, Ill.: Present—69. Proposed—35.

IRC 8665. **Slag**, C. L., min. wt. 100,000 lb., unless the marked capacity of car is less, in which even the marked capacity will apply, from Alton and Federal, Ill., to Waukegan, Ill. Present $3.80 net ton; proposed, $2 net ton.

8970-M-722. Commodity rate of $1.31 per net ton, applicable to **stone**, C. L., from Gale to Anna, Ill., will be canceled.

Lower Sand and Gravel Rates In the South

To ENABLE the railroads in the south to meet the competition of roadside pits and trucks, the I. C. C. has suspended, until its further order, orders issued by it in No. 17517, rates on chert, clay, sand and gravel within the state of Georgia and ten formal docket cases in which it prescribed rates, thus permitting the railroads to make rates on a mileage scale proposed by them.

* Note: Obsolete Machines cost more to operate than these Modern P&H Excavators

P&H Model 855
2 yard Shovel

Where digging depends upon steady operation, P&H all welded construction of alloy steels gives you bigger production with lower costs for yardage and maintenance. Available in sizes up to 5 cu. yds. capacity; Gas, Diesel or Electric Power. Write for literature on the size you need. Harnischfeger Corporation, 4465 West National Avenue, Milwaukee, Wisconsin.

HARNISCHFEGER CORPORATION

Sand-Lime Brick Production and Shipments

TEN active sand-lime brick plants reporting for March and nine for February, statistics for which were published in April.

Average Price for March

	Plant Price	Delivered Price
Detroit, Mich.	....	$16.00
Grand Rapids, Mich.	$11.00	14.00
Milwaukee, Wis.	10.00	12.50
Mishawaka, Ind.	10.50	....
Saginaw, Mich.	10.50	....
Seattle, Wash.	14.50	16.50
St. Louis Park, Minn.	8.50	10.00
Syracuse, N. Y.	14.00	16.00 C/L 20.00 L/C

Statistics for February and March

	February†	March‡
Production	683,000	1,489,275
Shipments (rail)	78,000	112,000
Shipments (truck)	1,096,150	1,837,948
Stock on hand	1,389,511	1,272,194
Unfilled orders	1,825,000	2,590,000

†Nine plants reporting: incomplete, three not reporting stock on hand and four not reporting unfilled orders.

‡Ten plants reporting: incomplete, one not reporting production, two not reporting stock on hand, and five not reporting unfilled orders.

Concrete Pavement Yardage

AWARDS of concrete pavement for March, 1939, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during Mar.	Total sq. yds. during first quarter 1939
Roads	859,600	3,630,599
Streets & Alleys	1,283,327	2,947,799
Airports	111,592	195,563
Totals	2,254,519	6,773,961

Large Increase in Rock Wool Production

NATIONAL MINERAL WOOL ASSOCIATION, New York, N. Y., reports an 88 percent increase in production of mineral wool bats and strips during the third quarter of 1938 over that of the first quarter, and a 37 percent increase over the second quarter.

Building Slurry Tanks

LONE STAR CEMENT CORP. recently let a contract to Boh Brothers Construction for piling and excavation for foundations for additional silos and slurry tanks.

Gravel Company Building Crushing Plant

THE G. G. HILL GRAVEL CO., Dexter, Mo., has announced that it will build a new plant at Delta, Mo., to manufacture limestone ballast and road specification gravel. Crushing plant equipment will be moved by barge to Cape Girardeau and then by rail to Delta. It is expected that the plant will be ready by the middle of May.

Safety Awards to Drivers

GENERAL MATERIAL CO., St. Louis, Mo., held a general meeting of its employes on April 1, at which certificates were awarded to 38 regular drivers who did not experience a truck accident during 1938. Special certificates and cash awards were also presented to three drivers who had "No Truck-Accident Records" during continuous employment by the company for ten years. Among the company's regular drivers on ready-mixed concrete trucks there are also two men with "no accident" records for nine years and three men for eight years.

Bituminous Paving Material Company Organized

PENNAC ASPHALT PRODUCTS CO., Johnstown, Penn., a new concern, will build a $40,000 plant to manufacture bituminous-concrete paving materials of both the hot and cold mix types. This company is controlled by the same financial interests that operate the Canoecreek Stone Co., and the Canoecreek Bituminous Materials Co., Johnstown, Penn. Elvin W. Overdorff is president; Frank C. Slep, vice-president; and Frank C. Overdorff, secretary-treasurer.

THE ROSS FEEDER

Completely controls the flow of any size material from Storage Bins, Hoppers or Open-Dump Chutes to Crushers, Conveyors, Screens, etc.

High in efficiency. Low in maintenance and power consumption.

Furnished in sizes to suit your operation. Send full particulars for recommendation.

ROSS SCREEN & FEEDER CO.

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NEW YORK, U. S. A.

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LONDON, S. W. 1., ENGLAND

THE INDUSTRY

Link-Belt Co., Chicago, has an exhibit in the Metals Building at the New York World's Fair portraying how industry can ease labor's burdens, expedite production and reduce costs, by using mechanical conveying equipment for handling materials from where they are to where they are wanted next.

Lincoln Electric Co., Cleveland, has opened a new office in Duluth, Minn., at 222 South 21st Avenue, East. I. R. Bartter will be in charge. The company has also opened a new office and warehouse in Seattle, Wash., at 1914 Utah Ave. J. B. McCormick will be in charge.

Thomas Laughlin Co., Portland, Me., has just appointed the John E. Livingstone Co., 2921 East Grand Blvd., Detroit, Mich., as its representative in that territory.

Goodyear Tire & Rubber Co., Akron, Ohio, announces that R. W. Sanborn, formerly district manager of mechanical goods sales at Pittsburgh, has been appointed manager of all hose sales, with headquarters in Akron; W. T. Bell, who has been manager of the hose department, has been placed in charge of distributor sales, a new department; C. A. Mathias has been promoted to mechanical goods district manager for the Pittsburgh district; and R. W. Richardson will replace Mr. Mathias as mechanical goods salesman at Buffalo.

Hewitt Rubber Corp., Buffalo, is celebrating the 80th anniversary of the founding in 1859 of the Gutta Percha and Rubber Mfg. Co., the Hewitt parent company. The Gutta Percha Co. was formed by an enterprising firm of New York manufacturing jewelers, Warren and Spadone. In 1904, Herbert H. Hewitt founded the Hewitt Rubber Co., and in 1926 the company acquired the business of the Gutta Percha and Rubber Mfg. Co. It has since continued to grow to its present size: a plant consisting of seven buildings, employing approximately 500 men and women regularly, thirty-three factory representatives and some two hundred distributors in the United States alone.

Bucyrus-Erie Co., South Milwaukee, Wis., announces the appointment of the following companies as representatives in their territories: Great Lakes Supply Corp., 324 W. 36th Street, Chicago, Ill.; Fuchs Machinery & Supply Co., 1102 Farnam St., Omaha, Neb.; and Quinn R. Barton, Inc., 1305 W. Forsyth St., Jacksonville, Fla.

Merritt-Chapman & Scott, New York City, announces that Earl A. Banister, executive vice-president, has been elected president to succeed the late Gwyn A. Whitney, with whom he was associated for 25 years both in the Whitney Brothers Co. of Duluth and after its acquisition by Merritt-Chapman & Scott.

Hardinge Co., Inc., York, Penn., announces that Harlowe Hardinge has been elected president of the company to succeed H. W. Hardinge, who is now chairman of the board. For the last sixteen years as vice-president and general manager he has personally directed the affairs of the company. He has a great number of patents granted in his name, covering grinding, classifying feeding, thickening, and drying equipment, the most recent of which has been his "electric ear." F. E. Finch has been elected vice-president and secretary.

Harlowe Hardinge

The Wickwire-Spencer Steel Co. and its subsidiary, the American Wire Fabrics Corp., announce the removal of their combined general offices and Eastern district sales offices to 500 Fifth Ave., New York, N. Y.

Joseph T. Ryerson & Sons, Inc., Chicago, Ill., has enlarged and modernized its Boston plant located at Third and Binney Streets, Cambridge. Total ground area occupied has been increased more than 30 percent and storage facilities to a still greater extent.

Hercules Powder Co., Wilmington, Del., is to erect a synthetic ammonia unit at its industrial explosives plant at Hercules, Calif. The plant is expected to be in service by January 1, 1940.

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Drop Forged Fittings

PERFORMERS on trapeze and the high wire require nerve — and perfect wire rope fittings. Thats why Leading Acrobats insists on LAUGHLIN Drop Forged Hardware.

Less spectacular, perhaps, but equally vital to safety, is the perfect performance of wire rope fittings for the multitude of uses in construction, mining and other industrial operations. LAUGHLIN Drop Forged Clips, Shackles, Swivels, Eye Bolts, Turnbuckles, Hooks, Links and other wire rope and chain fittings have been found so trustworthy that they are the choice of experienced contractors, engineers, executives and purchasing agents everywhere. You need this factor of safety. Protect the lives of your workmen and keep down compensation costs by specifying LAUGHLIN Drop Forged Wire Rope Fittings. You can tell them by the Triang-L Trade Mark, and by their perfect performance and long wear.

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Classified Directory of Advertisers

For alphabetical index see page 102

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Aerial Tramways
American Cable Co.
Hazard Wire Rope Co.
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Macwhyte Co.
Roebling's, John A., Sons Co.,

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Hetherington & Berner, Inc.
Ransome Concrete Machy. Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Air Compressors
Fuller Co.
Nordberg Mfg. Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Air Filters
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Fuller Co.
Northern Blower Co.
Roebling's, John A., Sons Co.

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Combustion Engr. Corp.
Gay, Rubert M., Div.
Link-Belt Co.
Northern Blower Co.
Raymond Pulv. Div.
Smidth, F. L., & Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

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Fuller Co.

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Wall-Colmonoy Corp.

Arrestors, Lightning
General Electric Co.

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Easton Car & Constr. Co.
Hetherinton & Berner, Inc.
Link-Belt Co.
Northern Blower Co.
Robins Conveying Belt Co.

Asphalt Mixer Regulators
Hetherington & Berner, Inc.

Asphalt Mixing Plants
Easton Car & Construction Co.
Hetherington & Berner, Inc.
Koehring Co.
Ransome Concrete Machy. Co.
Traylor Engineering & Mfg. Co.

Axles
Eagle Iron Works
Easton Car & Constr. Co.

Babbit Metal
Ryerson, Jos. T., & Sons, Inc.

Backdiggers
Link-Belt Co.

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Link-Belt Co.

Bag Cleaning Machines
Link-Belt Co.
Northern Blower Co.

Bagging Machines
Smidth, F. L., & Co.

Bag Ties
Wickwire-Spencer Steel Co.

Balers on Bundling Machines
Besser Mfg. Co.

Balls (Grinding)
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Bar & Angle Benders & Cutters
Ransome Concrete Machy. Co.

Barges
Eagle Iron Works

Batchers, Measuring Volume
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Fuller Co.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Ransome Concrete Machy. Co.

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Battery Chargers
General Electric Co.

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Chain Belt Co.
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Hetherington & Berner, Inc.
Link-Belt Co.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
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Bearings (Metal)
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Timken Roller Bearing Co.

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Belting (Transmission)
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Smidth, F. L., & Co.

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Link-Belt Co.

Belting (Wire)
Wickwire-Spencer Steel Co.

Belt Fasteners or Hooks
Flexible Steel Lacing Co.
Robins Conveying Belt Co.

Belt Idlers
Link Belt Co.
Robins Conveying Belt Co.
Smith Engineering Wks.

Belt Lacing
Flexible Steel Lacing Co.

Belt Tighteners
Link-Belt Co.
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Belt Trippers
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Fuller Co.
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Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.

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Merrick Scale Mfg. Co.

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Besser Mfg. Co.
Blaw-Knox Co.
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Diamond Iron Works, Inc.
Eagle Iron Works
Gay, Rubert M., Div.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Hetherington & Berner, Inc.
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Northern Blower Co.
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Rogers Iron Works
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Universal Road Machy. Co.

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Sauerman Bros.

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Diamond Iron Works, Inc.

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Link-Belt Co.
Robins Conveying Belt Co.

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American Hoist & Derrick Co.
Combustion Engineering Corp.

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Besser Mfg. Co.
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Hayward Company
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Sauerman Bros., Inc.

Buckets (Dredge & Excavator)
Blaw-Knox Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Hayward Co.
Hendrick Mfg. Co.

Buckets (Dump)
Brooks Equipt. & Mfg. Co., Inc.
Dempster Bros., Inc.
Jaeger Machine Co.

Buckets (Electric Heated, Weighing)
Easton Car & Construction Co.

Buckets (Elevator and Conveyor)
Bacon, Earle C., Co.
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Diamond Iron Works, Inc.
Eagle Iron Works
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
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Lewistown Fdry. & Machine Co.
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Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
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Traylor Engr. & Mfg. Co.

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Besser Mfg. Co.
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Blaw-Knox Co.
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American Cable Co. Inc.
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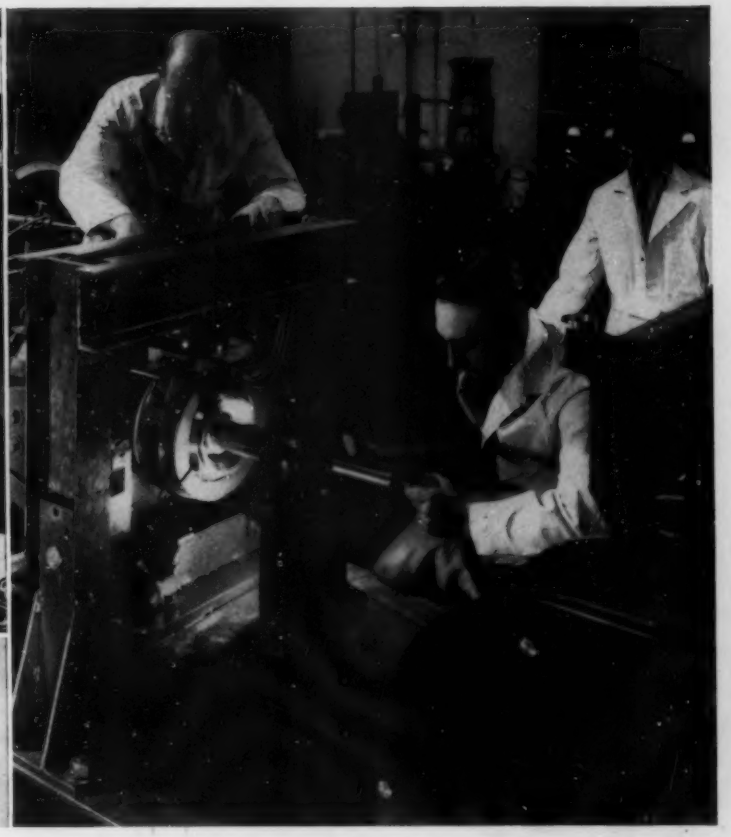

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Month after month ROCK PRODUCTS publishes stories of outstanding modernization programs which cement plants have completed or are contemplating. But in the August issue we will present a complete section designed to help cement men in every branch of the industry.

Just look at this imposing array of material—diversified enough to fit every reader's needs—sufficient in quantity to satisfy the most interested:

Dust Collection—An authoritative discussion of various types of dust collectors on stacks and on bag packers. Here is the answer to one of the most vital problems facing the cement industry today.

Manufacturing Control—No re-hash of general information but entirely new subjects, new thoughts, and new opportunities for process control, improving quality, and cutting costs. This portion of the issue alone will be one of the outstanding contributions to knowledge about the cement industry. Among the phases covered are such subjects as: Control in the Quarry; X-Ray; Chemical; Petrological; Mechanical and Electrical; Temperature and Combustion; Cooling and Tempering Clinker; Grinding; and Tests of Finished Products.

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Rehabilitation of Old Plants—Complete rebuilding in some cases; new layouts and new equipment in others. Several outstanding rehabilitation programs just completed by old established cement plants will show how this industry is constantly forging ahead.

Repair Parts—Why producers can often save and profit by buying of the original manufacturer.

AND IN ADDITION there will be many other articles of major interest including: Fuel Selection and Testing; New Process Cements; Predicting Demand; and How Many Kinds of Cement?

The August issue of ROCK PRODUCTS will do the same kind of complete job from an advertising angle and from a circulation angle. We will present to every cement plant in the United States and most foreign countries advertising of every conceivable type of machinery, equipment, and supplies required in the every-day operation of the different divisions of the industry.

From every point of view, this August issue of ROCK PRODUCTS will be the most complete CEMENT issue ever published and takes its place as the heart of your advertising campaign for reaching this important industry. Be sure you get the benefits of its intense reader interest, long life, extra circulation, and exclusive coverage.

Regular rates prevail. Forms close July 20. Additional details on request.

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Mepham, Geo. S., Corp.

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Cement Process Corp.

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Northern Blower Co.
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Robins Conveying Belt Co.
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Smidth, F. L., & Co.
Traylor Engineering & Mfg Co.

Chute Liners
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co.
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Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
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Circuit Testers
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Clarifiers
Chain Belt Co.
Link-Belt Co.

Classifiers
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Williams Patent Crusher & Pulv. Co.

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Jaeger Machine Co.
Koehring Co.
Multiplex Concrete Machy. Co
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Converters (Electric)
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Robins Conveying Belt Co.
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Wickwire-Spencer Steel Co.

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Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Fuller Company
Gay, Rubert M., Div.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Lewistown Fdry. & Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Drag-Chain)
Diamond Iron Works, Inc.
Link-Belt Co.

Conveyors (Overhead)
Chain Belt Co.

Conveyors (Pan)
Chain Belt Co.
Link-Belt Co.

Conveyors (Pneumatic)
Fuller Company
Northern Blower Co.
Raymond Pulv. Division

Conveyors (Portable)
Austin-Western Road Machy. Co.
Barber-Greene Co.
Diamond Iron Works, Inc.
Fuller Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.

Conveyors (Screw)
Besser Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Link-Belt Co.
Northern Blower Co.

Conveyors (Trolley)
Chain Belt Co.
Link-Belt Co.

Conveyors (Vibrating)
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Coolers
Blaw-Knox Co.
Link-Belt Co.
Northern Blower Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Coolers (Clinker)
Fuller Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cranes (Diesel Electric Steam, Etc.)
American Hoist & Derrick Co.
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Koehring Co.
Link-Belt Co.

Cranes (Overhead Traveling)
Harnischfeger Corp.
Industrial Brownhoist Corp.

Crawler Attachments
Harnischfeger Corp.
Link-Belt Co.

Cranes (Tractor)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Co.
Link-Belt Co.

Cranes (Truck)
Harnischfeger Corp.

Crawling Tractor Excavators
Austin-Western Road Machy. Co.
Koehring Co.
Link-Belt Co.

Crusher Parts
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Traylor Engr. & Mfg. Co.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
American Pulv. Co.
Austin-Western Road Machy. Co.
Brooks Equipment & Mfg. Co.
Dixie Machy. Mfg. Co.
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Austin-Western Road Machy. Co.
Earle C. Bacon, Inc.
Brooks Equipment & Mfg. Co.
Diamond Iron Works, Inc.
Dixie Machinery Mfg. Co.
Gay, Rubert M., Div.
Lewistown Fdry. & Machy. Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Rogers Iron Works Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Laboratory)
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Pennsylvania Crusher Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Reduction)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
McLanahan & Stone Corp.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Brooks Equipment & Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Rogers Iron Works
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing Rolls
Austin-Western Road Machy. Co.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Rogers Iron Works
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing and Screening Plants (Portable)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Brooks Equipment & Mfg. Co.
Diamond Iron Works, Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Heltzel Steel Form & Iron Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Rogers Iron Works
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Tyler, W. S. Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Decks, Vibrating Screen
Hendrick Mfg. Co.

Dedusters
Blaw-Knox Co.

An Insurance Policy on Wheels...
THE LIMA SHAY

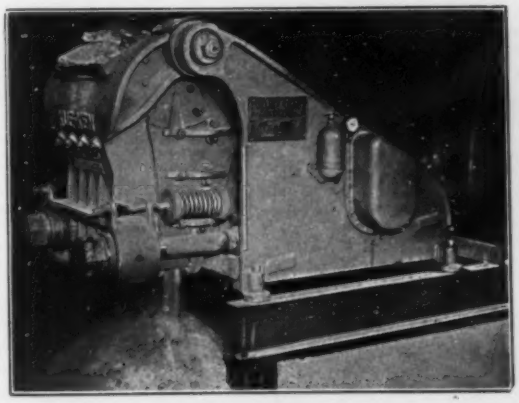
When you haul with a Lima Shay Geared Locomotive you are insuring yourself against slow-ups in production caused by slipping, stalling on tough curves and grades, or derailments.

The Shay is designed to haul maximum pay-loads quickly and economically. Its simple construction, with all parts readily accessible, facilitates the job of lubrication, adjustment, or repairs. Investigate fully the possibilities of Shay Power in your quarry.

LIMA LOCOMOTIVE WORKS, Incorporated
LIMA, OHIO
Sales Office: 60 E. 42nd St., New York, N. Y.

KUE-KEN BALANCED CRUSHERS

SAVE YOU MONEY on Primary, Secondary or Straight Crushing - - -



Crusher under full load making reduction ratio of 40 to 1—no foundations! All mechanism runs in filtered and dust tight oil bath. No outside oil pipes.

The KUE-KEN Balanced Crusher is truly an all-round universal crusher. Any KUE-KEN may be used for primary, secondary or straight crushing. When used for primary or secondary, they have 2 to 5 times the capacity of ordinary crushers. For straight crushing where large reduction ratios are required, KUE-KEN is the only crusher that will crush large rocks fine in a "single pass." The new KUE-KEN crushing principle does away with abrasion or rubbing between the jaws —less wear! far less power! Perfect balance and enormous leverages eliminate the need of heavy frames, power wasting flywheels and heavy expensive foundations. Catalog gives details of free crushing test service for guaranteed performance data on your own rock.

Send for Catalog 600 Today

STRAUB MFG. CO. 512 CHESTNUT STREET OAKLAND, CALIFORNIA

"THEY WON'T BUY CONCRETE MATERIALS FROM US— THEY WANT READY-MIXED"

BEFORE THIS HAPPENS TO YOU—CHECK UP ON THE REX FOUR-PROFIT PLAN!

Many a building supply dealer knows what it is to lose money-making orders for sand, stone and cement, because of the general trend towards the use of ready-mixed concrete. Before this happens to you, investigate the Rex *"Four Profit Plan"* for building supply dealers — see how others are meeting the same problem and making money at it! Find out how, in mixing, transporting and placing Moto-Mixed concrete you can make profits simultaneously on sand, stone, cement and concrete—See how you can start to double or triple your yearly volume of sales to the fast growing list of ready-mixed users.

SEND FOR NEW CATALOG!

"This Year and Every Year" is a new book which gives a complete and detailed resume of the many exclusive features you get in Rex Moto-Mixers—*features that mean more yards mixed per dollar invested!* Address the Chain Belt Company, 1649 W. Bruce Street, Milwaukee, Wisconsin.

REX MOTO-MIXERS

Classified Directory (Cont.)

Dehydrators
Pioneer Engr. Works, Inc.

Derricks
American Hoist & Derrick Co.
Hayward Company

Detonators
Ensign-Bickford Co.

Dewatering Machines
Chain Belt Co.
Diamond Iron Works, Inc.
Eagle Iron Wks.
Jaeger Machine Co.
Link-Belt Co.

Diaphgrams (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel)
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
Harnischfeger Corp.
Koehring Co.
Link-Belt Co.

Disentegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Link-Belt Co.

Dragline & Cableway Excavators
American Cable Co.
American Hoist & Derrick Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Harnischfeger Corp.
Hazard Wire Rope Co.
Koehring Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Sauerman Bros., Inc
Wickwire-Spencer Steel Co.

Dredges
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc. (Complete Steel)
Link-Belt Co.

Dredge Cutter Heads & Ladders
Bucyrus-Erie Co.
Eagle Iron Wks.
Hetherington & Berner, Inc.

Dredge Hulls
Eagle Iron Works

Dredging Sleeves
Hetherington & Berner, Inc.

Drilling Accessories
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drill Bits
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drill Sharpening Machines
Bucyrus-Erie Co.

Drills (Blast Hole)
Bucyrus-Erie Co.

Drills (Rock)
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills (Well)
Bucyrus-Erie Co.

Drives (Belt, Chain and Rope)
Bacon, Earle C., Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Short Center)
Earle C. Bacon, Inc.
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Blaw-Knox Co.
Combustion Engineering Corp.
Hetherington & Berner, Inc.
Lewistown Fdry. & Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulv. Division
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
Williams Patent Crusher & Pulv. Co.

Dust Arrestors
Blaw-Knox Co.

Dust Collecting Systems
Blaw-Knox Co.
Buell Engineering Co., Inc.
Hendrick Mfg. Co.
Northern Blower Co.
Raymond Pulv. Division
Smidth, F. L., & Co.

Dust Collector Bags
Blaw-Knox Co.

Dust Conveying Systems
Blaw-Knox Co.
Fuller Company
Raymond Pulv. Division

Electric Cables
General Electric Co.

Electric Motors
General Electric Co.
Hayward Co.

Electric Motor Starters
General Electric Co.

Elevators
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Fuller Company
Gay, Rubert M., Div.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Lewistown Fdry. & Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Engineers (Designing & Consulting)
Bacon, Earle C., Co.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Merrick Scale Mfg. Co.
Northern Blower Co.
Productive Equipment Corp
Robins Conveying Belt Co.
Rogers Iron Works
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel, Gasoline, Kerosene and Oil)
American Hoist & Derrick Co.

Engines (Steam)
American Hoist & Derrick Co.
Nordberg Mfg. Co.

Exhausters
Combustion Engineering Corp.
Raymond Pulv. Div.

Classified Directory (Cont.)

Fans (Exhaust & Ventilating)
Blaw-Knox Co.
General Electric Co.
Northern Blower Co.
Smidth, F. L., & Co.

Feeders
Earle C Bacon, Inc.
Barber-Greene Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M., Div.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Merrick Scale Mfg. Co.
Northern Blower Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Schaffer Poidometer Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.

Filter Cloth
Northern Blower Co.
Roebling's, John A., Sons Co.,
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.

Forgings
Bacon, Earle C., Inc.
Thomas Laughlin, Inc.

Frogs & Switches
Easton Car & Construction Co.
Frog, Switch & Mfg. Co.

Fuels (Diesel)
Texas Co.

Furnaces (Heat Treating, Electric)
General Electric Co.

Fuse Cutouts
General Electric Co.

Fuse Cutters
Ensign-Bickford Co.

Fuses (Detonating & Safety)
Ensign-Bickford Co.

Fuse (Electric)
General Electric Co.

Fuse Lighters
Ensign-Bickford Co.

Galvanometers
General Electric Co.

Gaskets
Goodyear Tire & Rubber Co., Inc.

Gasoline
Gulf Refining Co.
Texas Company

Gas Producers
Blaw-Knox Co.

Gear-Motors
General Electric Co.
Link-Belt Co.

Gears
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Works, Inc.
General Electric Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Generators & Motor Generator Sets
General Electric Co.
Nordberg Mfg. Co.

Glass Sand Equipment
Lewistown Fdry. & Machine Co.

Grapples
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.

Grating
Blaw-Knox Co.
Eagle Iron Works
Hendrick Mfg. Co.

Grease
Bacon, Earle C., Co.
Gulf Refining Co.
Texas Company

Grease Cups
Link-Belt Co.
Robins Conveying Belt Co.

Guards (Lamp)
Flexible Steel Lacing Co.

Guards (Machinery)
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Tyler, W. S., Co.

Guns (Hydraulic & Spray)
Hetherington & Berner, Inc.

Gypsum Plants
Traylor Engr. & Mfg. Co.

Haulage Systems (Electric)
General Electric Co.

Haulage Systems (Remote Control)
Dempster Bros., Inc.
General Electric Co.
Koehring Co.

Heaters (Bitumen)
Easton Car & Construction Co.

Hoists (Chain, Electric, Portable, Skip, Etc.)
American Hoist & Derrick Co.
Besser Mfg. Co.
Chain Belt Co.
Commercial Shearing & Stamping Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Easton Car & Construction Co.
Gay, Rubert M., Div.
Harnischfeger Corp.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engineering Wks. Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engr. Wks.
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.

Hoppers
Austin-Western Road Machy Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Gay, Rubert M., Div.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Link-Belt Co.
Merrick Scale Mfg. Co.
Pioneer Engineering Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Works
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.

Hose (Water, Steam, Air Drill Pneumatic, Sand Suction and Discharge)
Dixie Machinery Mfg. Co.
Goodyear Tire & Rubber Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.

Hydrators (Lime)
Blaw-Knox Co.
Traylor Engr. & Mfg. Co.

Jigs (Sand and Gravel)
Traylor Engineering & Mfg. Co.

Joists & Slab Machines (Concrete)
Besser Mfg. Co.

Kiln Burners
Smidth, F. L., & Co.

Kiln Chain System
Smidth, F. L., & Co.

Kiln Liners (Metal)
Traylor Engr. & Mfg. Co.

IT'S STANDING UP WELL, BILL
YOU'RE RIGHT, STAN. WE THINK IT'S ABOUT THE BEST THERE IS
IT'S TELLURIUM
GENERAL ELECTRIC TELLURIUM COMPOUND
A shielded, Type SH, cable similar to the type used on this big gold dredge

THE fact that this company, a big gold-mining property on the Pacific Coast, has selected G-E tellurium-rubber cable for its dredge No. 5, testifies to the ability of this cable to stand up under such severe service.

The cable shown in the pictures is a shielded type (Type SH), 3,000 volts, three-conductor, 350,000 cir mils, 1200 feet long.

IDEAL FOR SERVICE

This cable is flexible and does not readily kink; it is light in weight and small in diameter. It has a smooth surface and is little likely to pick up weeds, trash, dirt, or other foreign material. All these features save time in moving the dredge or shovel.

The tellurium-rubber jacket is tough and capable of resisting much abrasion and has long-aging qualities.

TOWARD LONG-TERM ECONOMY

The constant increase in size of electric shovels and dredges has made the task of selecting a type of trailing cable difficult. Voltage, loading cycles, heating, regulation, protection to workmen, economics—all these factors must be taken into account.

You profit most when the cable is right for each job. To this end, make full use of the services of a G-E cable specialist and get the most for your cable dollar. He can help in the selection of the *right* type—for long-term economy. Address nearest G-E sales office or General Electric Company, Dept. 6—201, Schenectady, New York.

ALWAYS THE RIGHT TYPE FOR EACH JOB

GENERAL ELECTRIC

This NORBLO Bag Type Collector is used when dust is reasonably dry but not readily shaken off from a flat surface.

NORBLO Engineers are prepared to make complete plant surveys covering every process and division in the rock products industry with reliable dust determinations and recommendations based on an accumulated experience in this field. Write for bulletins.

A Complete Line—Complete Service—Guaranteed Results

THE NORTHERN BLOWER COMPANY
6409 BARBERTON AVENUE CLEVELAND OHIO

***The* Rock Products Industry looks to AMERICAN**

For lowest operating costs, long, trouble-free service, minimum upkeep costs and maximum production of superior products. The reason is simple—every part is made of the finest material, power requirements are low, they are simple in design but sturdy in construction.

Let us show you how AMERICAN CRUSHERS will step up your production and cut down your costs. More than 30 years of experience are built into these powerful crushing units.

Write for further details

American Pulverizer Company
1245 Macklind Avenue St. Louis, Mo.

Classified Directory (Cont.)

Kilns Parts
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Kilns (Rotary)
Blaw-Knox Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Kilns (Vertical)
Blaw-Knox Co.

Kiln Burners
Smidth, F. L., & Co.

Kiln Chain Systems
Smidth, F. L., & Co.

Kiln Liners (Metal)
Traylor Engr. & Mfg. Co.

Kominuters
Smidth, F. L., & Co.

Laboratory Apparatus
Ransome Concrete Machy. Co.
Smidth, F. L., & Co.

Lift Trucks
Besser Mfg. Co.

Light Plants
Harnischfeger Corp.

Lime Handling Equipment
Combustion Engineering Corp.
Fuller Co.
Link-Belt Co.
Raymond Pulv. Division
Robins Conveying Belt Co.
Traylor Engineering & Mfg. Co.

Lime Plants
American Pulverizer Co.
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Loaders (Boat)
Chain Belt Co.
Fuller Co.
Link-Belt Co.

Loaders (Bin, Car, Hopper, Truck, Etc.)
Barber-Greene Co.
Besser Mfg. Co.
Bucyrus-Erie Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Fuller Company
Gay, Rubert M., Div.
Link-Belt Co.
Robins Conveying Belt
Ross Screen & Feeder Co.
Universal Road Machy. Co.

Loaders (Box Car)
Barber-Greene Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Link-Belt Co.

Loaders (Underground)
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Nordberg Mfg. Co.

Locomotive Stack Netting
Tyler, W. S., Co.

Locomotives (Diesel-Electric)
Lima Locomotive Works, Inc. (Locomotive Div.)

Locomotives (Electric, Trolley & Storage Battery)
General Electric Co.
Lima Locomotive Works, Inc. (Locomotive Div.)

Locomotives (Gasoline & Gas-Electric)
General Electric Co.
Lima Locomotive Works, Inc. (Locomotive Div.)

Locomotives (Kerosene)
Lima Locomotive Works, Inc. (Locomotive Div.)

Locomotives (Oil & Oil-Electric)
General Electric Co.
Lima Locomotive Works, Inc. (Locomotive Div.)

Locomotives (Steam)
Lima Locomotive Works, Inc. (Locomotive Div.)

Lubricants
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co.

Machine Shop Equipment
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Magnetic Separators
Diamond Iron Works, Inc.
Link-Belt Co.
Robins Conveying Belt Co.

Magnets
General Electric Co.

Manganese Steel Parts
Bacon, Earle C., Inc.
Dixie Machy. Mfg. Co.
Frog, Switch & Mfg. Co.

Material Handling Equipment
Austin-Western Road Machy. Co.
Barber-Greene Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Fuller Company
Harnischfeger Corp.
Heltzel Steel Form & Iron Co.
Link-Belt Co.
Northern Blower Co.
Raymond Pulv. Division
Robins Conveying Belt Co.

Measuring Devices
Blaw-Knox Co.
Fuller Co.
General Electric Co.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Schaffer Poidometer Co.

Mechanical Rubber Goods
Goodyear Tire & Rubber Co.

Mill Liners
Dixie Machy. Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mill Parts
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Mills, Grinding (Ball, Tube, Hammer, Rod, Roll, Etc.) (See also Pulverizers)
American Pulverizer Co.
Brooks Equipment & Mfg. Co.
Combustion Engineering Corp.
Dixie Machinery Mfg. Co.
Lewistown Fdry. & Machine Co.
Pennsylvania Crusher Co.
Raymond Pulv. Division
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Mortar Colors
Mepham, Geo. S., Corp.

Mortar Mixers
Chain Belt Co.
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machy. Co.

Nozzles (Gravel Washing)
Chain Belt Co.
Link-Belt Co.

Oil Burners
Smidth, F. L., & Co.

Oils (Cutting)
The Texas Co.

Oils (Lubricating)
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
The Texas Co.

Ornamental Forms (Concrete)
Besser Mfg. Co.

Outdoor Lighting Equipment
General Electric Co.

Packing
Goodyear Tire & Rubber Co.

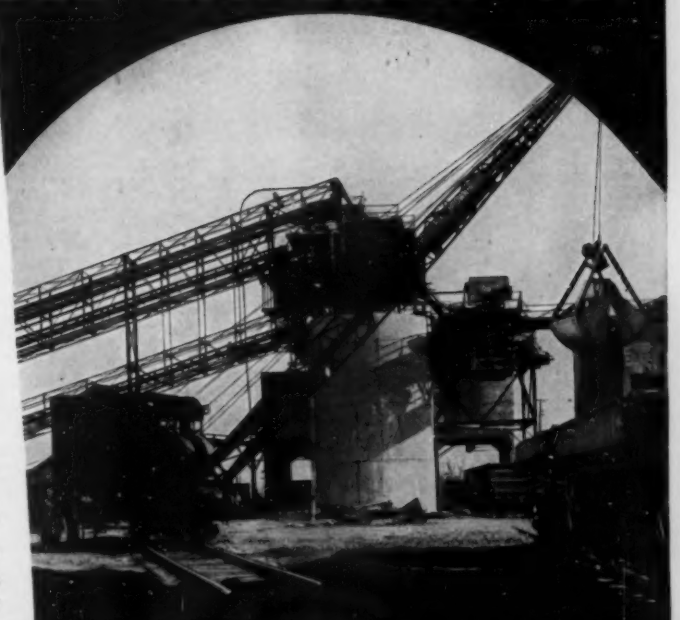
Pallets
Anchor Concrete Machinery Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Commercial Shearing and Stamping Co.
Multiplex Concrete Machy Co.

INDISPENSABLE EXPERIENCE!

The training of a big league ball player usually starts . . . but never finishes . . . on the sand lots. The years in between, hard years often, are spent in gaining the experience which a star performer must have.

Industrial Brownhoist started gaining its experience many years ago . . . well over a half century. During this time we have built thousands of locomotive cranes, crawler cranes, bridge cranes and buckets . . . far more than most manufacturers. During this time, too, we have worked with manufacturers in every line of industry, helping them solve their own peculiar handling problems.

Industrial Brownhoists invariably more than live up to their owner's expectations simply because we do understand all of their conditions and are experienced in building cranes and buckets to meet them. The new Industrial Brownhoists offer many improvements over the models of even a year or two ago. May we explain them to you?



INDUSTRIAL BROWNHOIST

GENERAL OFFICES: BAY CITY, MICHIGAN

DISTRICT OFFICES

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RESEARCH SERVICE DEPARTMENT, *Rock Products*, 205 W. Wacker Drive, Chicago, Ill.

We are in the market for and would like to receive prices and literature on the items checked below:

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- ....Aerial Tramways
- ....Aggregates (Special)
- ....Agitators
- ....Air Compressors
- ....Air Separators
- ....Architectural Trimstone Molds
- ....Ash Receptacle Molds
- ....Ash & Refuse Handling Equipment
- ....Asphalt Mixing Plants
- ....Backdiggers
- ....Backfillers
- ....Bags
- ....Bagging Machines
- ....Balls (Grinding)
- ....Barges
- ....Batchers (Weighing)
- ....Bearings
- ....Belting (Conveyor & Elevator)
- ....Bins (Storage)
- ....Blasting Supplies
- ....Block Machines, Building
- ....Boats
- ....Brick Machines & Molds
- ....Buckets
- ....Building Tile Machines
- ....Bulk Cement Batching Plants
- ....Bulk Cement Storage Plants
- ....Bulldozers
- ....Bullscrapers
- ....Burial Vault Forms
- ....Calcining Equipment
- ....Calcium Chloride
- ....Cars (Industrial)
- ....Catch Basin Block Machines
- ....Cement Plants
- ....Cement Colors
- ....Cement Process
- ....Central Mixing Plants (Concrete)
- ....Chimney Block Machines & Molds
- ....Clarifiers
- ....Classifiers
- ....Coal Pulverizing Equipment
- ....Concentrators
- ....Concrete Mixers
- ....Concrete Paints & Coatings
- ....Concrete Waterproofing & Dampproofing
- ....Conveyors
- ....Conveyor Idlers and Rolls
- ....Coolers
- ....Corn Crib Block and Tile Machines
- ....Correcting Basins
- ....Cranes (Crawler & Locomotive)
- ....Crushers
- ....Crushing & Screening Plants (Portable)
- ....Culvert Pipe Machines & Molds (Concrete)
- ....Curing Equipment
- ....Curb Forms (Concrete)
- ....Dedusters
- ....Dehydrators
- ....Derricks
- ....Dewatering Equipment
- ....Dippers & Teeth
- ....Disintegrators
- ....Dragline Cableway Excavators
- ....Drain Tile Machines
- ....Dredges
- ....Dredge Pumps
- ....Drills (Rock)
- ....Drill Bits
- ....Drill Sharpening Machines
- ....Drill Steel
- ....Dryers
- ....Dust Collecting Systems
- ....Dust Precipitators
- ....Dust Recovery Plants
- ....Dynamite
- ....Electric Motors
- ....Electrostatic Separators
- ....Elevators
- ....Engineering Service (Consulting & Designing)
- ....Engines (Diesel, Gasoline, Steam)
- ....Feeders
- ....Fence Post Molds & Machines (Concrete)
- ....Floor Tile Machines (Concrete)
- ....Garbage Receptacle Molds (Concrete)
- ....Garden Furniture Molds (Concrete)
- ....Generators & Motor Generator Sets
- ....Greenhouse Bench Forms (Concrete)
- ....Guns (Hydraulic)
- ....Gutter Block Machines (Concrete)
- ....Hoists
- ....Hoppers
- ....Hose
- ....Hydrators (Lime)
- ....Joist & Slab Machines (Concrete)
- ....Kilns (Rotary, Shaft, Vertical)
- ....Laboratory Apparatus
- ....Laundry Tub Molds (Concrete)
- ....Light Post & Standard Forms
- ....Lime (Hydrated)
- ....Lime Handling Equipment
- ....Lime Plants
- ....Lime Putty Plants
- ....Loaders
- ....Locomotives
- ....Mills (Ball, Compartment, Emery, Hammer, Rod, Roll, Tube)
- ....Mortar Mixers
- ....Pallets (Steel, Wood)
- ....Pans, Grinding (Wet & Dry)
- ....Perforated Metal
- ....Pipe Molds and Machines (Concrete)
- ....Pipe
- ....Plaster Mixers
- ....Pontoons
- ....Pulverizers
- ....Pumps (Pulverized Material)
- ....Railway Equipment
- ....Rectifiers
- ....Recuperators
- ....Refractories
- ....Rewashers (Screw)
- ....Rock Wool Cupolas
- ....Roofing Tile Machines
- ....Sand Drags
- ....Sand & Gravel Plants
- ....Sand Lime Brick Machinery
- ....Sand Settling Tanks
- ....Scales
- ....Scrapers (Power Drag)
- ....Screens (Revolving, Vibrating, Etc.)
- ....Seal Rings
- ....Septic Tank Molds (Concrete)
- ....Sewer Pipe Machines (Concrete)
- ....Shale Planers
- ....Shovels (Power)
- ....Sidewalk Forms
- ....Silo Forms (Concrete)
- ....Silos (Storage)
- ....Silo Stave Machines
- ....Slakers (Rotary)
- ....Slurry Mixers
- ....Slurry Pumps
- ....Slurry Separators
- ....Slurry Thickeners
- ....Step Forms (Concrete)
- ....Tampers (Hand & Power)
- ....Tanks (Storage)
- ....Tractors
- ....Trucks (Agitator)
- ....Trucks (Dump)
- ....Trucks (Industrial)
- ....Trucks (Mixer Body)
- ....Unloaders
- ....Unloaders (Boat)
- ....Unloaders (Box Car)
- ....Wagons (Dump)
- ....Wall Forms & Machines (Concrete)
- ....Washers (Sand, Gravel & Stone)
- ....Welding & Cutting Equipment
- ....Well Curbing Machine & Molds (Concrete)
- ....Wire Cloth
- ....Wire (Copper, Iron & Steel)
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The straight stay-bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

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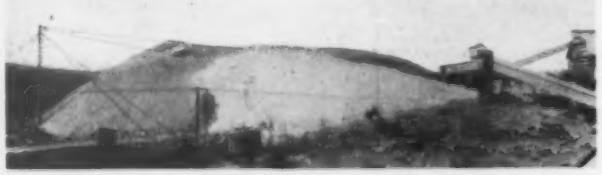
The only Streamlined Bottomless Bucket.



Here is how one producer uses a simple setup of a Sauerman Scraper to cut cost of storing and reclaiming aggregate.

Classified Directory (Cont.)

Pans, Grinding (Wet & Dry)
Eagle Iron Works
McLanahan & Stone Corp.
Traylor Engineering & Mfg. Co.

Perforated Metal
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perf. Co
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Joseph T. Ryerson & Son, Inc.
Standard Stamping & Perforating Co.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Perforated Screen Plates & Cloth—See Screen Cloth & Plates

Pinions
Bacon, Earle C., Inc.
Chain Belt Co.
Frog Switch & Mfg. Co.
General Electric Co.
Link-Belt Co.

Pipe Molds and Machines (Concrete)
Besser Mfg. Co.
Universal Concrete Pipe Co.

Pipe
Frog, Switch & Mfg. Co.
Hetherington & Berner, Inc.

Pipe Fittings
Hetherington & Berner, Inc.

Pipe Forms & Machines (Concrete)
Besser Mfg. Co.
Universal Concrete Pipe Co.

Plaster Colors
Mepham, Geo. S., Corp.

Plaster Mixers
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machy. Co.

Plaster Plants
Koehring Co.

Poidometers
Schaffer Poidometer Co.

Pontoons
Diamond Iron Works, Inc.
Eagle Iron Works

Power Transmission Machinery
Chain Belt Co.
Diamond Iron Works, Inc.
Link-Belt Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Timken Roller Bearing Co.

Power Units
Nordberg Mfg. Co.

Pulleys
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Works, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.

Pulverizer Parts
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Frog, Switch & Mfg. Co.
Smidth, F. L., & Co.

Pulverizers (Hammer, Ring, Rod & Roll) (See Also Mills & Crushers)
American Pulverizer Co.
Blaw-Knox Co.
Brooks Equipment & Mfg. Co.
Combustion Engineering Corp.
Dixie Machy. Mfg. Co.
Gay, Rubert M., Div.
Lewistown Fdry. & Machine Co.
Pennsylvania Crusher Co.
Raymond Pulv. Division
F. L. Smidth & Co.
Traylor Engineering & Mfg Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Diaphragm)
Chain Belt Co.
Jaeger Machine Co.

Pump Valves (Dry Pulverized Material)
Fuller Co.

Pumps (Dredge)
Bucyrus-Erie Co.
Hetherington & Berner, Inc.

Pumps (Dry Pulverized Material)
Fuller Company
Smidth, F. L., & Co.

Pumps (Slurry)
Smidth, F. L., & Co.
Wilfley, A. R., & Sons, Inc.

Pumps Valves (Slurry)
Fuller Co.
Wilfley, A. R., & Son, Inc.

Pumps (Vacuum)
Fuller Company
Smidth, F. L., & Co.

Pumps (Water)
Chain Belt Co.
Jaeger Machine Co.

Railway Equipment
Easton Car & Construction Co.
General Electric Co.

Railways (Electric)
General Electric Co.

Rectifiers
General Electric Co.

Recuperators
Traylor Engineering & Mfg. Co.

Refractories
Smidth, F. L., & Co.

Regulators (Voltage)
General Electric Co.

Rewashers (Screw)
Eagle Iron Wks.
Link-Belt Co.
Smith Engineering Works

Rheostats
General Electric Co.

Roofing
Ryerson, Jos. T., & Son, Inc.
Texas Co., The

Sand Drags
Eagle Iron Wks.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Smith Engr. Wks.

Sand and Gravel Plants
Bacon, Earle C., Co.
Diamond Iron Wks.
Eagle Iron Works
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks. Inc.
Robins Conveying Belt Co.
Traylor Engineering & Mfg Co.

Sand Lime Brick Machinery
Diamond Iron Wks.

Sand Separators
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Simplicity Engr. Co.
Smith Engineering Wks.

Sand Settling Tanks
Eagle Iron Wks.
Hendrick Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engineering Wks., Inc.
Smith Engr. Wks.

Scales (Conveyor)
Chain Belt Co.
Merrick Scale Mfg. Co.

Scales (Hopper)
Blaw-Knox Co.
Merrick Scale Mfg. Co.

Scrapers (Power Drag)
American Hoist & Derrick Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Wks.
Harnischfeger Corp.
Hayward Company
Link-Belt Co.
Pioneer Engineering Wks., Inc.
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Scrapers (Wagon)
Bucyrus-Erie Co.

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PROFITS?

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Plant operators everywhere testify that their pump capacities have been increased up to 300 per cent and with practically no increase in overhead and operating expense. The result is at least doubling of profits. At the same time they have been able to increase their pumping depth. All this has been accomplished by installing an EAGLE "Swintek" Screen Nozzle Ladder.

The cutters loosen the hardest deposits of sand and gravel and the traveling screen automatically carries away from in front of the suction all boulders and obstructions that are likely to cut down your steady flow of gravel. Easily adapted to your present equipment.

Send for descriptive bulletin covering the many outstanding advantages of the Eagle "Swintek." Also ask for particulars on Eagle Paddle Type Log Washers and Eagle Screw Washers.

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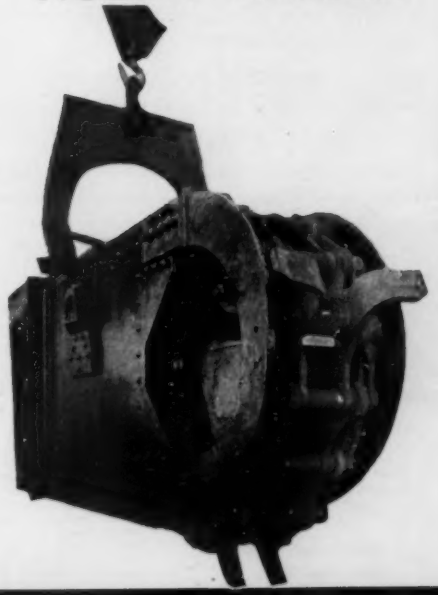
DES MOINES, IOWA

EAGLE

"SWINTEK" SCREEN
NOZZLE LADDER



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Patents issued and pending in the United States, Canada, and in leading Central and South American and European Countries.

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. . . AND IT LASTS LONGER

On vibrating, revolving or shaking screens, Hendrick Perforated Plate.

The uniform mesh and full clearance of Hendrick Perforated Plate gives better screening, means better screening—and lower costs—on shaking, vibrating or revolving screens. The high carbon steel—the heat treated high carbon steel—tempered for wear, lasts longer—and still further reduces costs.

Add to these advantages the fact that you can get Hendrick Perforated Plate in any size or shape of perforation and you have another reason for adopting Hendrick Perforated Plate. Complete data on request.

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2 cu. yd. drop-bottom detachable buckets for any 1½ ton truck. All the load carried on the chassis.

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Screen Cloth & Plates (Perforated)
Bacon, Earle C., Inc.
Brooks Equipt. & Mfg. Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Standard Stamping & Perforating Co.
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.

Screen Parts
Bacon, Earle C., Co.
Diamond Iron Wks.
Hendrick Mfg. Co.
Pioneer Engineering Wks., Inc.
Screen Equipment Co.
Traylor Engineering & Mfg. Co.
Wickwire-Spencer Steel Co.

Screens
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Chicago Perforating Co.
Diamond Iron Wks.
Eagle Iron Wks.
Hendrick Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Roebling's Sons Co.
Simplicity Engr. Co.
Smith Engineering Wks.
Traylor Engineering & Mfg. Co.
Tyler, W. S., & Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens (Grizzly)
Diamond Iron Wks.
Eagle Iron Works
Gay, Rubert M., Div.
Hendrick Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Ross Screen & Feeder Co.
Screen Equipment Co.
Smith Engineering Works
Traylor Engineering & Mfg Co.
Tyler, W. S., Co.
Universal Road Machy. Co.
Universal Vibrating Screen Co.

Screens (Laboratory)
Hendrick Mfg. Co.
Link-Belt Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Austin-Western Road Machy Co.
Bacon, Earle C., Inc.
Brooks Equipt. & Mfg. Co.
Chain Belt Co.
Diamond Iron Wks.
Eagle Iron Wks.
Gay, Rubert M., Div.
Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Rogers Iron Wks. Co.
Smith Engr. Wks.
Standard Stamping & Perforating Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Road Machy. Co.

Screens (Rotary)
Link-Belt Co.
Smith Engineering Wks.

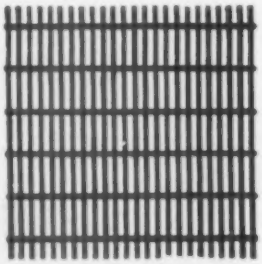
Screens, Scalping
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Screens (Trommel)
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Screens (Vibrating)
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Brooks Equipt. & Mfg. Co.
Chain Belt Co.
Diamond Iron Wks.
Eagle Iron Works
Hendrick Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co
Roebling's, John S., Sons Co.
Rogers Iron Wks. Co.
Screen Equipment Co.
Simplicity Engr. Co.
Smith Engineering Works
W. S. Tyler Co.
Universal Vib. Screen Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Washing)
Chain Belt Co.
Link-Belt Co.
McLanahan & Stone Corp.
Screen Equipment Co.

Scrubbers (Washers)
Link-Belt Co.
McLanahan & Stone Corp.
Rogers Iron Wks. Co.
Smith Engineering Wks.



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CLEVELAND SCREENS are star performers—returning larger capacities, increased profits and more accurate separations at lower cost. Cleveland Screens save money with the initial investment because, if they are made of the longer-wearing, wear-resisting ALLOY NO. 2—Cleveland Screens stay on the job long after ordinary screens would have been replaced.

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THE CLEVELAND WIRE CLOTH & MFG. CO.

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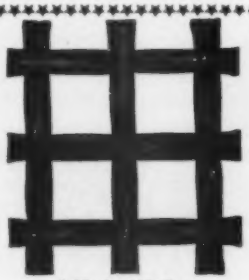

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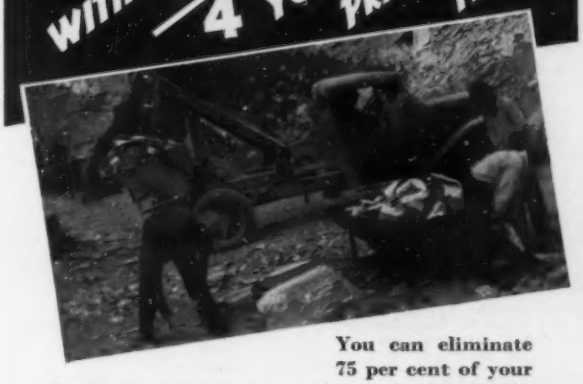

You can eliminate 75 per cent of your heavy investment in trucks with the Brooks Load-Lugger, wherever loading is done by hand. Decrease truck operating costs . . . eliminate wasted standing idle time. ONE Load-Lugger and 4 to 8 Load-Lugger Buckets can do the work of a number of trucks . . . with far greater production and at much less cost. Write for the complete cost-cutting story. Demonstrations arranged in most sections.

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"We've added a new man to our sales force!"

That's what a prospect told us recently when we suggested he advertise regularly in ROCK PRODUCTS. He seemed to think that by placing an additional man on his sales force he had solved his sales problem.

FORTUNATELY—we had no trouble convincing him that he could add 6000 salesmen to his sales staff by using ROCK PRODUCTS each month—that he could assist his new man to capitalize on his calls by making prospects familiar with his product through ROCK PRODUCTS—the paper which is always read by the busy executive.

Why don't you add ROCK PRODUCTS to your sales force? It costs very little in comparison to its value.

ROCK PRODUCTS
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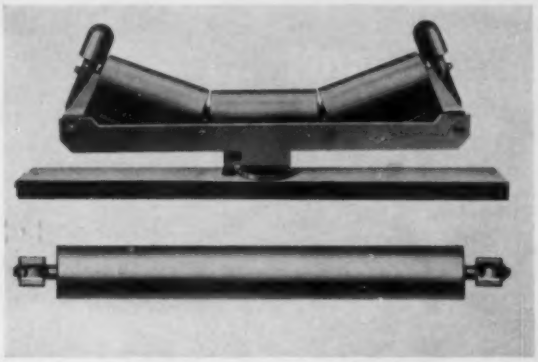

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ROBINS MAKES: Belt Conveyors, Screens, Feeders, Gates, Bucket Elevators, Grab Buckets and all their accessories.

A crooked running belt is expensive. It causes excessive wear on belt edges. Robins Training Idlers prevent crooked running in both the carrying and return strands. Trainers substituted for about every sixth idler (Robins or other make) will keep belts in line.

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Check up on S-D Automatic Bottom Dumping Trailers. The trailer that gives you continuous operation . . . discharging and closing on the run, with no auxiliary powered mechanisms. Built for heavy service and easy, fast manipulation. Here's the trailer for stripping hauling and dumping costs to rock bottom. Let an S-D engineer tell you why.

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CRUSHERS • SCREENS

FINER PRODUCT
GREATER CAPACITY
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These advantages have made Symons Cones first among reduction crushers.

SIZES CLOSER
SAVES HEADROOM
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the wearing parts of your earth moving equipment
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(YELLOW TIP ELECTRODE)

The deposit from this crystal coated rod is tough, hard, and shockproof, making it well adapted for resisting the rough treatment which such parts invariably receive.

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for ROCK—
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Eagle Iron Wks.

Sheaves
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Eagle Iron Wks.
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Roebling's, John A., Sons Co.
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Industrial Brownhoist Corp.
Koehring Co.
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Koehring Co.
Link-Belt Co.

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Link-Belt Co.
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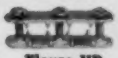
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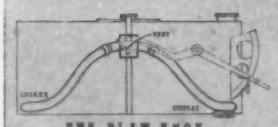
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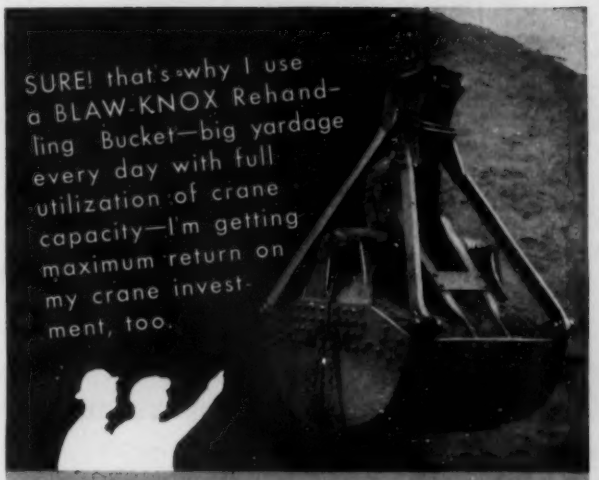
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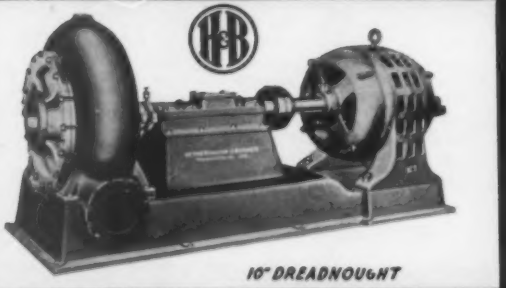

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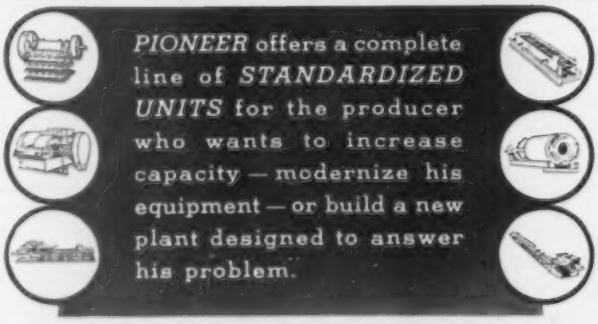

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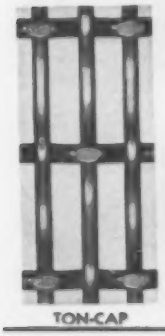

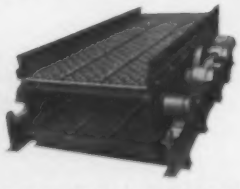

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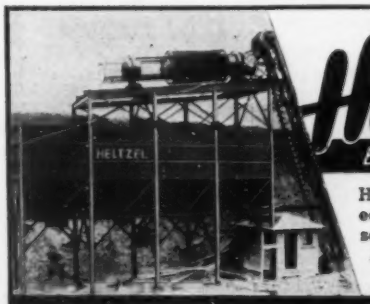

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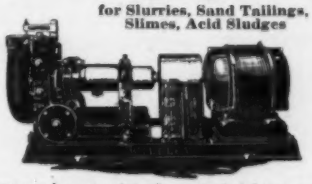

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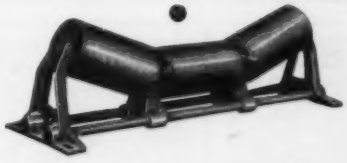

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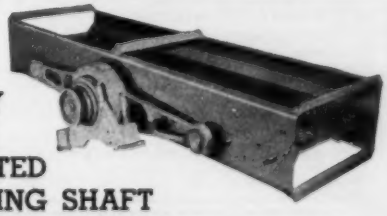

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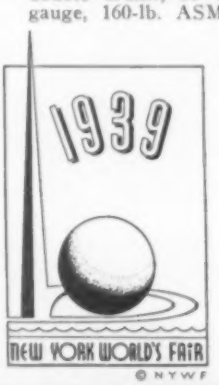

1 — Koehring Model 601 Diesel driven Crawler Shovel, 1½-yd. dipper.

1 — Lima Model 602 Gasoline driven Crawler Shovel, 1½-yd. dipper.

1—Lorain 77 Gasoline Crawler Shovel, 1½-yd. dipper, new late 1937.
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1—Marion ¾-yd. All Electric Model 21 Crawler Shovel.
1—Marion 450 Combination Shovel and Crane, 1¼-yd. dipper, 50' crane boom.
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1—10x8 Ingersoll-Rand Air Compressor.
1—6" Blast Hole Drill, Loomis, "Clipper" wire line, gasoline driven, traction.

VIBRATING SCREENS

7—Jeffrey Traylor Vibrating Screens —Electric; 2 FB-2, 41"x6'; 5 BF-4, 4'x7'. Also three Motor Generator Sets for these screens.
2—Niagara 4x8' double deck; 4x8' Robins double deck; 4—3x6' Sturtevant M-V, double deck; Tyler Hummer 3x5, 4x5, 4x7.
1—Rotex "Jumbo" with 2—3x11' 3-deck, on common frame.
3—ROTARY SCRUBBERS, GOOD ROADS, 4'x6', 2—4x8', each with 20 H.P. motor.
2—WASH BOXES, 18' c/c with 3' blades; 24' c/c with 4' blades.

AIR COMPRESSORS

2—310' Ingersoll-Rand Portables, on AB Mack trucks, dual pneumatic tires; also 2—220 CFM., same mounting.
2—POC 2 I-R Diesel driven 550 CFM., 100 lb.
1—PRE-2 I-R 1300 ft. with synchronous motor.

ROTARY DRYERS

8—Direct Heat; 3x20', 4x30, 5x26, 5x30, 6x40, 6x60, 8'8x85'.
5—ROTARY KILNS: 7x100', 8x110', 8x125'.

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JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72. Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 24x36 & 18x36. P&M 24x36. Good Roads 1030 & 1040. Cedar Rapids and others 15x36, 13x36, 9x36, 9x20, 9x15, Etc.
REDUC. TYPE: Kennedy No. 19, No. 25 & No. 37. Tels. 40. Traylor 6", 10" & 13" Model 37TJ & Type T. Super. McCully 6" & 10". Newhouse 5, 7 & 10". Symons 2', 3' & 4' Cone & 36" & 48" Disc Ty.
ROLLS: Allis-C. 12½x12", 36x16, 40x15, 54x24 & 72x30. Cornish 36x56. Fairmount 36x60 and Jeffrey 24x24 to 36x54 Single Roll Crushers.
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MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x6. Hardinge 3'x3', 8'x30", 6'x9'. Misc. Tube Mills 5' & 6' x 22'. Sturtevant Ring Roll, Raymonds, Kents, Fuller-Lehigh, Etc., Etc.
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1—Sauerman Slackline Elec. Hoist with 150 hp. motor.
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1—Moore Speed Crane, ser. No. 170, 60' boom, ¾ yd. bucket.

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Head & tail pulleys, take-ups, rollers, idlers.

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Dredge pumps, 6", 8", 10", 12", 16".
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7 Steel Encased Chain & Belt Elevators:
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Air ¾ to 1½ in., Water ¾ to 10 in.

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All Sizes Belt, Idlers, Pulleys, Drives.
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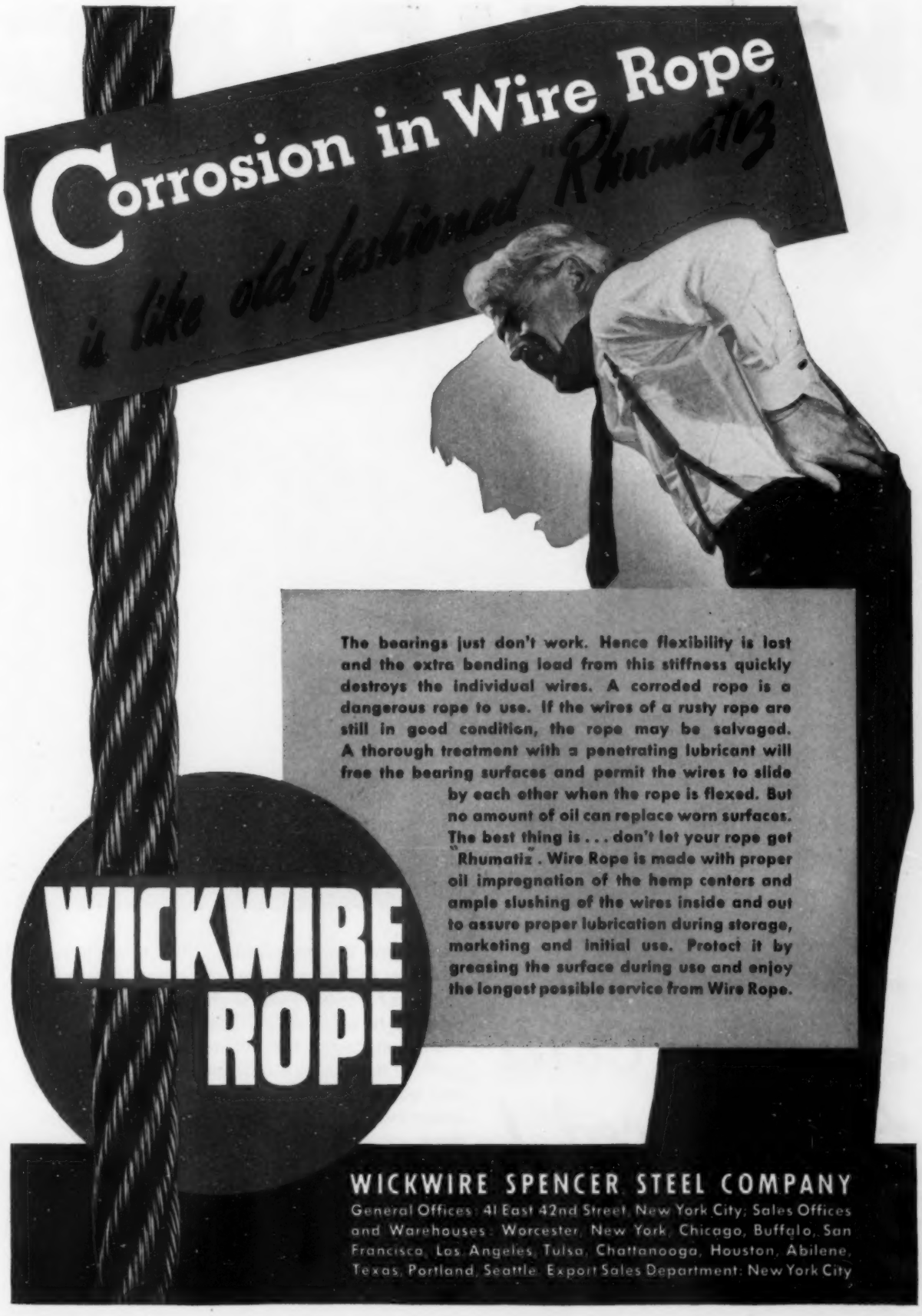
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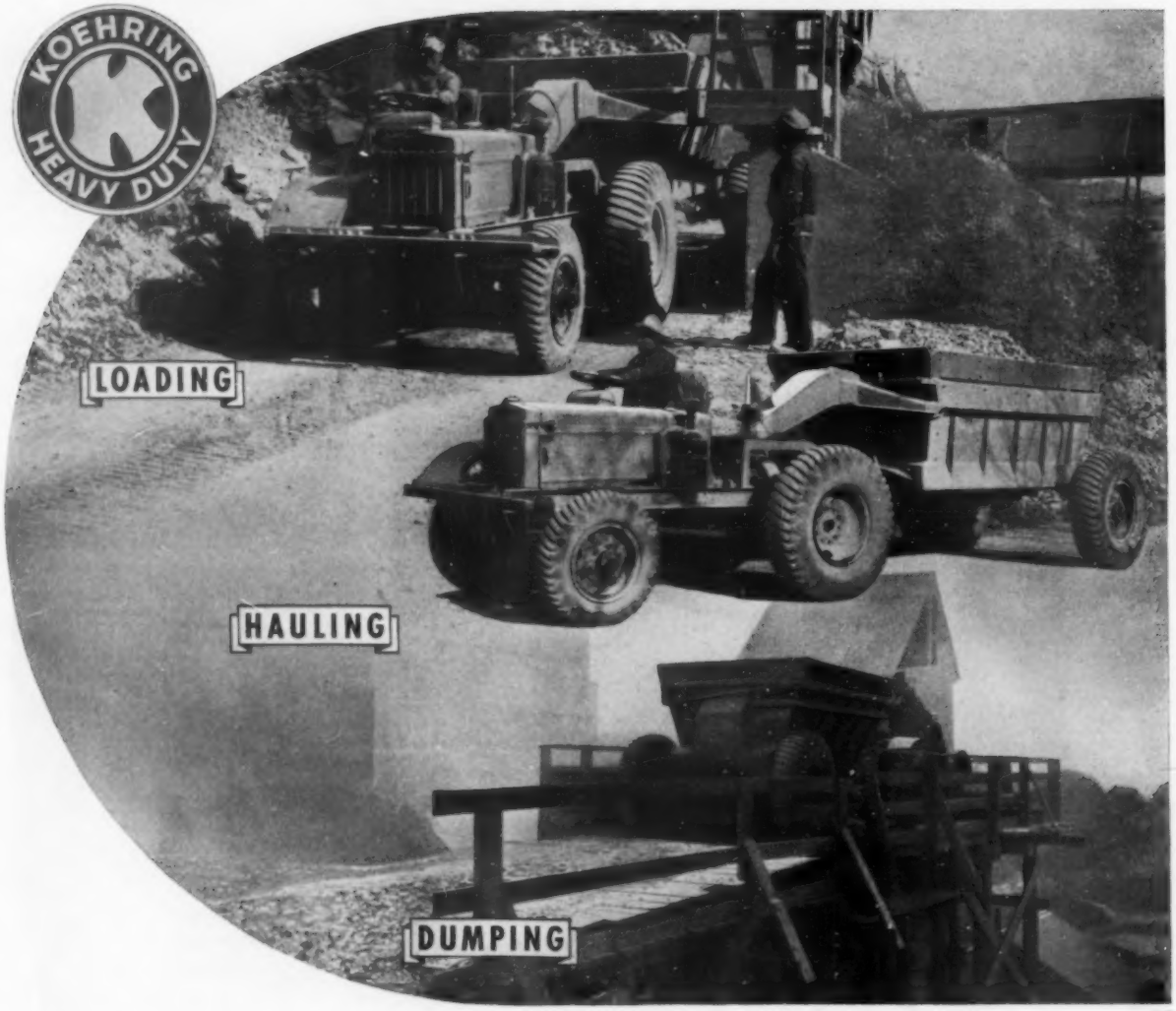

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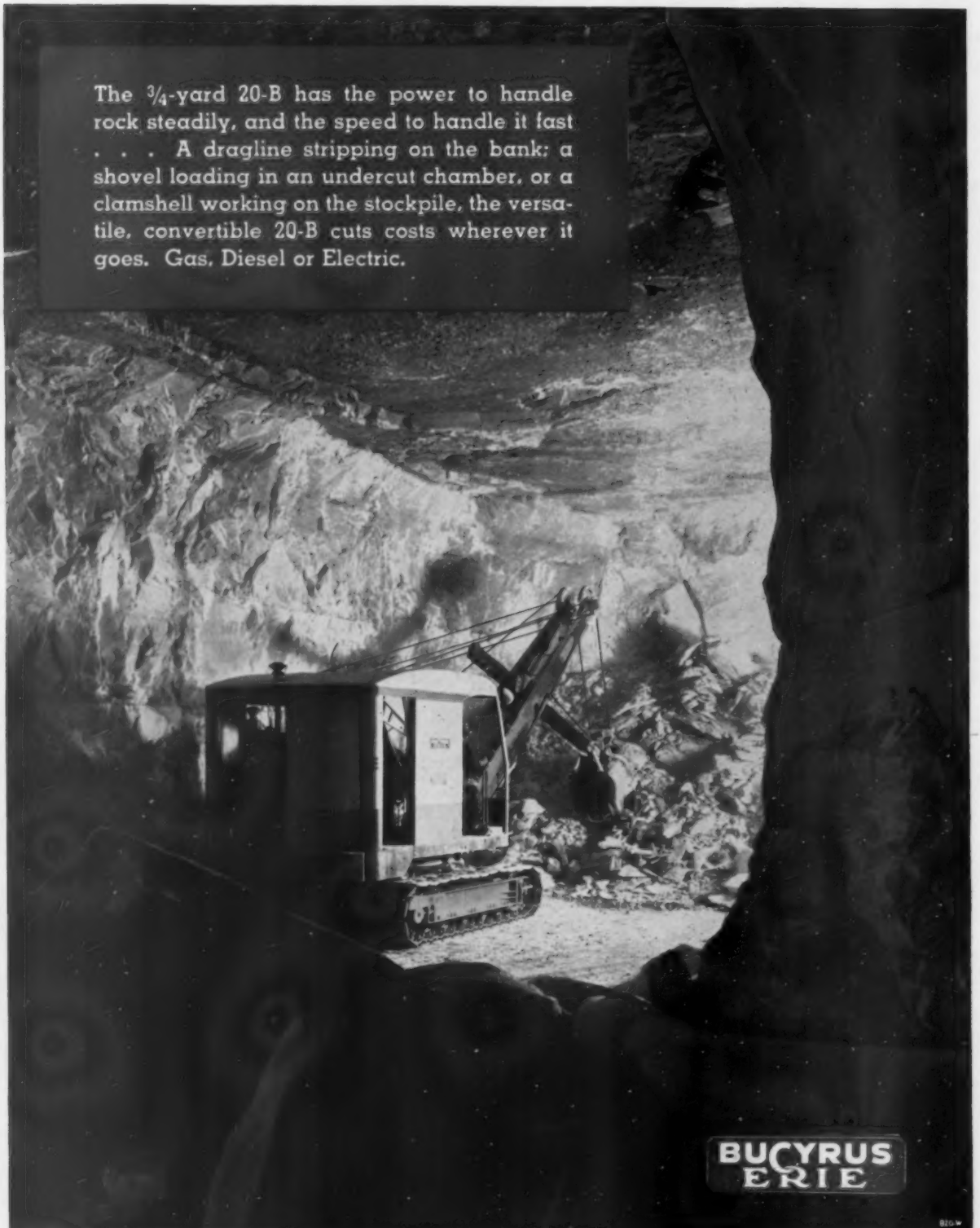

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